ORIGINAL

USA Environmental, Inc.

Standard Operating Procedures for

MEC Removal Action Elkton Farm Firehole Site, Elkton, MD

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Chapter 1

STANDARD OPERATING PROCEDURE
ACCIDENT REPORTING
PROCESSING ACCIDENT FORMS

1.0 BACKGROUND

Accident forms are used to document and record injuries, illnesses, and damage to equipment that occur on USA Environmental, Inc. (USAE) project sites. Injuries, illnesses, and damaged equipment meeting the reporting requirements of Federal, State, and contractual directives will be submitted in a complete and timely manner per the reporting instructions, directives, and policies.

1.1 SCOPE

This Standard Operating Procedure (SOP) contains information for completing, submitting, and tracking Accident Reporting Forms. It may also require the addition of policies and publications relevant to updating, correcting, or changing information pertaining to accidents and investigations. It is incumbent upon all designated personnel who are responsible for completing, signing, submitting, or tracking Accident Reporting Forms and to familiarize themselves with this SOP and its accompanying documents, and to periodically review the material in an effort to remain current with procedures.

2.0 OPERATIONS

USAE employees who work on project sites are required to report all accidents, injuries, illnesses, and damaged equipment to their Supervisor and/or Safety personnel immediately. Corrective action is to be taken to eliminate or mitigate the potential for hazardous or dangerous conditions on the project site, which may result in accidents, injuries, illnesses, or damaged equipment. Documentation is a key element in operations.

3.0 RESPONSIBILITIES

The following personnel, by position, are responsible for the completion, review, signing, and submitting of Accident Reporting Forms:

- USAE UXO Technician III: Responsible for submitting the accident form with the necessary data to the UXOSO for investigation, and complying of forms and supporting documents. Signs the accident form as the first line supervisor.

- USAE Unexploded Ordnance Safety Officer (UXOSO)/Site Safety and Health Officer (SSHO): responsible for compiling and submitting the initial form(s) in accordance with form instructions and guidance. Making the initial notification of reportable accidents to the USAE Corporate Office and performing an investigation into the accident.

- USAE Occupational Safety Manager (OSM): responsible for reviewing, completing, signing, and sending the accident form(s) with attachments to the USAE Corporate Office in Tampa, FL. Following up on the notification made from the project site and ensuring updated information is received and personnel are medically tracked to completion.

- USAE Corporate Safety and Health Manager: responsible for the corporate implementation and enforcement of the USAE Safety Program and for reviewing and signing the accident from(s) for submittal. Follows up notification from the project site and tracks personnel medically when the USAE Occupational Safety Manager is not available.

- USAE Project/Site Manager: responsible for implementation of policies and procedures. May be required to perform in Project or Site Manager position in the absence of the other for reviewing, completing, signing, and submitting accident forms.

- USAE Corporate Office/Human Resources Administrator: responsible for the mailing (FedEx) and tracking of the form(s) to the appropriate agencies or personnel. Generating copies of required documents. Other duties as assigned by the USAE Human Resources Director.

4.0 REPORTING REQUIREMENTS AND PROCESS

The following reporting requirements will be observed when preparing, signing, and submitting Accident Reporting Form(s):

- Only the authorized USAE forms will be submitted. See the attached blank copy located in the Accident Prevention Plan/Site Safety and Health Plan for an example.
- Signature blocks will be signed by UXOT III, safety personnel or designated representative as appropriate.
- Activity Hazards Analysis (AHA) Sheet(s) will be submitted with the Accident Reporting Form. Tasks that do not have an AHA at the time of the accident will have them generated for approval prior to resuming the task.

Upon completion of the Accident Reporting Form, attachment of the AHA, as applicable, and any other supporting documents (statements, photographs, drawings) the packet will be sent by FedEx to the USAE Corporate Office in Tampa, FL, addressed to the Safety and Health Manager. There, it will be placed into the appropriate reporting system.

Projects requiring Accident Reporting Forms from sources (i.e., Eng Form 3394) other than USAE will follow those specific requirements as directed. Forms, instructions, and reporting requirements will be supplied on a project by project basis.

4.1 REFERENCES

- USAE Safety Program;
- Engineer Manual 385-1-1; and
- Occupational Safety and Health Administration.

5.0 SUMMARY

This SOP is designed for USAE personnel who have the responsibility of preparing, signing, and submitting Accident Reporting Forms for work related injuries, illnesses, damaged equipment, and accidents meeting the reporting requirements and guidance provided by Federal, State, and company directives and policies. The information contained within this SOP is not all inclusive, it requires the responsible personnel to follow the referenced material and submit the Accident Reporting Forms in a timely manner.

Chapter 2

STANDARD OPERATING PROCEDURE
AMMUNITION AND EXPLOSIVES TRANSPORTATION

1.0 PURPOSE

The purpose of this Ammunition and Explosives Transportation Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the transportation of explosives and unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

The following USA Environmental, Inc. (USA) policies are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with the Work Plan, Site Safety and Health Plan, applicable Federal, State, and local regulations, and contract restrictions and guidance.

2.0 SCOPE

This SOP applies to all site personnel, including contractor and subcontractor personnel, involved in the conduct of operations on a site with UXO/MEC contamination. This SOP is not intended to contain all of the requirements needed to ensure compliance. Consult the documents listed in Section 6.0 of this SOP for additional compliance issues.

3.0 TRANSPORTATION REQUIREMENTS FOR EXPLOSIVES AND MEC

Transportation of munitions and explosives of concern (MEC) and explosives will comply with all Federal, State, and local regulations. Permits are not required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for on-site or on Federal Installation transportation of explosives or MEC. Off-site shipment of MEC will be made using commercial carriers approved to transport ammunition and explosives. Class A and B, for the DoD. For off-site shipment:

- MEC will be packaged in accordance with 49 CFR part 173.
- Drivers will be provided DD Form 836 (Special Instructions for Motor Vehicle Drivers).
- Vehicles will be inspected using DD form 626, Motor Vehicle Inspection, and be properly placarded.
- Compatibility requirements will be observed.
- The load shall be well braced and, except when in closed vans, covered with a fire-resistant tarpaulin.

4.0 FEDERAL INSTALLATIONS/ON SITE

Transportation of explosives and MEC on site and on Federal Installations will comply with the following:

- Vehicles will be inspected daily using DD form 626, Motor Vehicle Inspection, and will be properly placarded.
- Explosives will be transported in closed vehicles whenever possible. When using an open vehicle, explosives will be covered with a flame resistant tarpaulin (except when loading/unloading).
- Vehicle engine will not be running when loading/unloading explosives.
- Beds of vehicles will have either a plastic bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings.

- Vehicles transporting explosives will have a first aid kit, two 10 BC rated fire extinguisher, and communications capability.
- Initiating explosives, such as blasting caps, will remain separated at all times.
- Compatibility requirements will be observed.
- Operators transporting explosives will have a valid drivers license.
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable for conditions. Vehicles transporting explosives off-road will not exceed 25 MPH.

5.0 SUMMARY

Transportation of explosives presents risks to both the vehicle operator and the surrounding populace. The procedures contained in this SOP are designed to eliminate and/or mitigate these risks. Personnel engaged in these activities will strictly comply with these procedures and those contained in the referenced documents.

6.0 REFERENCES

Procedures and information contained in this document were obtained from the below listed references:

- EP 385-1-95a Basic Safety Concepts and Considerations for Ordnance and Explosives Operations
- USAE Corporate Safety and Health Program (CSHP)
- 27 CFR Part 55, Commerce in Explosives
- 29 CFR 1910, Occupational Safety and Health Standards
- 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- BATF 5400.7, Bureau of Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, Department of Defense (DoD) Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement

- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 385-40 w/USACE supplement, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications

Chapter 3

STANDARD OPERATING PROCEDURE – OPS-03
DEMOLITION/DISPOSAL OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the conduct of demolition/disposal operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USA Environmental, Inc. (USAE) site personnel, including contractor and subcontractor personnel, involved in the conduct of UXO/MEC demolition/disposal operations on a UXO/MEC contaminated site. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with approved project plans and applicable referenced regulations. Consult the documents listed in Section 12.0 of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES

3.1 PROJECT MANAGER

The Project Manager (PM) will be responsible for ensuring the availability of the resources needed to implement this SOP, and will also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

3.2 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) will be responsible for assuring that adequate safety measures and housekeeping are performed during all phases of site operations, to include demolition activities, and will visit site demolition locations, as deemed necessary, to ensure that demolition operations are carried out in a safe, clean, efficient, and economic manner. The demolition activities will then be conducted under the direct control of the SUXOS, who will have the responsibility of supervising all demolition operations within the area.

The SUXOS will be responsible for training all on-site UXO personnel regarding the nature of the materials handled, the hazards involved, and the precautions necessary. The SUXOS will also ensure that the Daily Operational Log, Ordnance Accountability Log, USAE Demolition Shot Records, and inventory records are properly filled out and accurately depict the demolition events and demolition material consumption for each day's operations. The SUXOS will be present during all demolition operations or designate a competent, qualified person to be in charge during any absences.

3.3 UXO SAFETY OFFICER

The UXO Safety Officer (UXOSO) for the site is responsible for ensuring that all demolition operations are being conducted in a safe and healthful manner, and is required to be present during all MEC demolition operations. The UXOSO will ensure the compliance of the demolition team with the above referenced documents that are applicable to the particular task being performed.

3.4 UXO QUALITY CONTROL SPECIALIST

The UXO Quality Control Specialist (UXOQCS) is responsible for ensuring the completeness of demolition operations records and for weekly inspection of the Ordnance Accountability Log, the Daily Operational Log, the USAE Demolition Shot Record, and the inventory of MEC and demolition material. The UXOQCS, assisted by demolition team personnel, will inspect each demolition pit and an area of appropriate radius after each demolition shot, in accordance with the approved explosive siting plan, to ensure that there are no kick-outs, hazardous UXO/MEC components, or other hazardous items. In addition, the pit may be checked with a magnetometer and large metal fragments, and any hazardous debris, will be removed on a per use basis in accordance with the SOW. Any UXO/MEC discovered during the QC check will be

properly disposed of using the demolition procedures in the WP. Extreme caution must be exercised when handling UXO/MEC, which has been exposed to the forces of detonation. Personnel must adhere to acceptable safe practices and procedures when determining the condition of munitions and fuzes that have not been consumed in the disposal process.

4.0 GENERAL OPERATIONAL AND SAFETY PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in operations on UXO/MEC-contaminated sites will be familiar with the potential safety and health hazards associated with the conduct of demolition/disposal operations, and with the work practices and control techniques used to reduce or eliminate these hazards. During demolition operations, the general safety provisions listed below will be followed by all demolition personnel, at all times. Noncompliance with the general safety provisions listed below will result in disciplinary action, which may include termination of employment:

All safety regulations applicable to demolition range activities and demolition and MEC materials involved will be complied with.

- Demolition of any kind is prohibited without an approved siting plan.
- The quantity of MEC to be destroyed will be determined by the range limit, fragmentation and K-Factor distance calculations.
- In the event of an electrical storm, dust storm, or other hazardous meteorological conditions, immediate action will be taken to cease all demolition range operations and evacuate the area.
- In the event of a fire, which does not include explosives or energetic material, put out the fire using the firefighting equipment located at the site; if unable to do so, notify the fire department and evacuate the area. If injuries are involved, remove the victims from danger, administer first aid, and seek medical attention.
- The UXOSO is responsible for reporting all injuries and accidents that occur.
- Personnel will not tamper with any safety devices or protective equipment.
- Any defect or unusual condition noted that is not covered by this SOP will be reported immediately to the SUXOS or UXOSO for evaluation and/or correction.
- Methods of demolition will be conducted in accordance with this SOP and approved changes or revisions thereafter
- Adequate fire protection and first aid equipment will be provided at all times.
- All personnel engaged in the destruction of MEC will wear clothing made of natural fiber, close-weave clothes, such as cotton. Synthetic material such as nylon is not authorized unless treated with anti-static material.
- Care will be taken to minimize exposure to the smallest number of personnel, for the shortest time, to the least amount of hazard, consistent with safe and efficient operations.
- Work locations will be maintained in a neat and orderly condition.
- All hand tools will be maintained in a good state of repair.
- Each heavy equipment and/or vehicle operator will have a valid operator's permit or license for the equipment being operated.
- Equipment and other lifting devices designed and used for lifting will have the load rating and date of next inspection marked on them. The load rating will not be exceeded and the equipment will not be used without a current inspection date.

- Leather or leather-palmed gloves will be worn when handling wooden boxes, munitions, or UXO/MEC.
- Lifting and carrying require care. Improper methods cause unnecessary strains. Observe the following preliminaries before attempting to lift or carry:
  - When lifting, keep your arms and back as straight as possible, bend your knees and lift with your leg muscles.
  - Be sure you have good footing and hold, and lift with a smooth, even motion.
- The demolition range will be provided with two forms of communication, capable of contacting appropriate personnel or agencies (i.e., medical response, QRF).
- Motor vehicles and material handling equipment (MHE) used for transporting MEC or demolition materials must meet the following requirements:
  - Exhaust systems will be kept in good mechanical repair at all times.
  - Lighting systems will be an integral part of the vehicle.
  - One Class 10B:C rated, portable fire extinguisher will, if possible, be mounted on the vehicle outside of the cab on the driver's side, and one Class 10B:C fire extinguisher will be mounted inside the cab.
  - Wheels of carriers must be chocked and brakes set during loading and unloading.
  - No demolition material or MEC will be loaded into or unloaded from, motor vehicles while their motors are running.
- Motor vehicles and MHE used to transport demolition material and MEC will be inspected prior to use to determine that:
  - Fire extinguishers are filled and in good working order.
  - Electrical wiring is in good condition and properly attached.
  - Fuel tank and piping are secure and not leaking.
  - Brakes, steering, and safety equipment are in good condition.
  - The exhaust system is not exposed to accumulations of grease, oil, gasoline, or other fuels, and has ample clearance from fuel lines and other combustible materials.
- Employees are required to wear leather, or rubber, gloves when handling demolition materials. The type of glove worn is dependent on the type of demolition material.
- A red warning flag, such as a "Active Range Flag" or a wind sock, will be displayed at the entrance to the demolition range during demolition operations when required by local authority. If applicable, the entrance gate will be locked when demolition work is in process.
- Unless otherwise directed or authorized by the explosive siting plan, all demolition shots will be tamped with an appropriate amount of earth/dirt.
- An observer will be stationed at a location where there is a good view of the air and surface approaches to the demolition range, before material is detonated. It will be the responsibility of the observer to order the SUXOS to suspend firing if any aircraft, vehicles, or personnel are sighted approaching the general demolition area.

- Two-way radios will not be operated in close proximity of the demolition range while the pit is primed or during the priming process. Radio transmissions and explosives will be separated by a minimum of 50 feet.
- No Demolition operation will be left unattended during the active portion of the operation (i.e., during the burn or once any explosives or UXO/MEC are brought to the range).
- A minimum radius (determined by size and location of the shot) around the demolition pit will be cleared of dry grass, leaves, and other extraneous combustible materials around the demolition pit area.
- No demolition activities will be conducted if there is less than a 2,000-foot ceiling or if wind velocity is in excess of 20 mph.
- Demolition shots must be fired during daylight hours (minimum time for sunrise and sunset is determined by the firing procedure used (i.e., electric, non-electric, shock tube 30/60/60).
- Notification of the local authorities will be made in accordance with the site requirements.
- No more than two persons will ride in a truck transporting demolition material or MEC, and no person will be allowed to ride in the trailer/bed.
- Vehicles will not be refueled when carrying demolition material or MEC, and must be 100 feet from magazines or trailers containing such items before refueling.
- All explosive vehicles will be cleaned of visible explosive and other contamination, before releasing the vehicles for other tasks.
- Prior to conducting any other task, personnel will wash their face and hands after handling demolition material or MEC.
- Demolition pits will be spaced a safe distance feet apart, with no more than 10 pits prepared for a series of shots at any one time.

5.0 SPECIAL REQUIREMENTS FOR DEMOLITION ACTIVITIES

The following safety and operational requirements will be followed during demolition range operations. Any deviations from this procedure will be allowed only after receipt of written approval from the PM and the client. Failure to adhere to the requirements and procedures listed in the paragraphs below could result in serious injury or death; therefore, complete compliance with these requirements and procedures will be strictly enforced.

5.1 GENERAL REQUIREMENTS

The general demolition range requirements listed below will be followed at all times:

- The CEHNC "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Munitions and Explosives of Concern (MEC) Sites," will be followed when destroying multiple munitions by detonation on site. This document will be present on site during site operations.
- White Phosphorus and propellant will only be disposed of in an approved manner and following the guidance for maximum temperature exposure (90 degrees Fahrenheit).
- Material awaiting destruction will be stored at not less than intra-line distance, based on the largest quantity involved, from adjacent explosive materials and from explosives being destroyed. The material will be protected against accidental ignition or explosion from fragments, grass fires, burning embers, or detonating impulses originating in materials being destroyed.

- UXO/MEC or bulk explosives to be destroyed by detonation should be detonated in a pit not less than 3 feet deep and covered with earth which protrudes not less than 2 feet above existing ground level. Requirements may be found in the explosive siting plan. The components should be placed on their sides or in a position to expose the largest area to the influence of the demolition material. The demolition material should be placed in intimate contact with the item to be detonated and held in place by tape or earth packed over the demolition materials. The total quantity to be destroyed below ground at one time will not exceed the range limit.

- Detonations will be counted to ensure detonation of all pits. After each series of detonations, a search will be made of the surrounding area for UXO/MEC. Items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next shot. Fuzed ammunition, or items that may have internally damaged components, will be detonated in place, if possible.

- Prevailing weather condition information can be obtained from the local weather service, or other acceptable source and the data logged in the Demolition Shot Log before each shot or round of shots.

- All shots will be dual primed.

- Whenever possible, during excavation of the demolition pits contour the ground so that runoff water is channeled away from the pits. If demolition operations are discontinued for more than two weeks, the pits should be backfilled until operations resume.

- Upon completion of the project, all disturbed demolition areas will be thoroughly inspected for UXO/MEC. Depending upon contract requirements, the site may have to be backfilled and leveled. If necessary, this will be coordinated with the contractor representative.

- Prior to and after each shot, the USAE Demolition Shot Record is to be filled out by the SUXOS with all applicable information. This record will be kept with the Ordnance Accountability Log and reflect each shot.

5.2 ELECTRIC DETONATOR USE

The following requirements are necessary when using electric detonators and blasting circuits:

- Electric detonators and electric blasting circuits may be energized to dangerous levels from outside sources such as static electricity, induced electric currents, and radio communication equipment. Safety precautions will be taken to reduce the possibility of a premature detonation of the electric detonator and explosive charges of which they form a part. Radios will not be operated while the pit is primed or during the priming process.

- The shunt will not be removed from the leg wires of the detonator until the continuity check of the detonator is to be performed.

- When uncoiling, or straightening, the detonator leg wires, keep the explosive end of the detonator pointing away from the body and away from other personnel. When straightening the leg wires, do not hold the detonator itself, rather hold the detonator leg wires approximately 1 inch from the detonator body. Straighten the leg wires by hand; do not throw or wave the wires through the air to loosen them.

- Prior to use, the detonators will be tested for continuity. To conduct the test, place the detonators in a pre-bored hole in the ground or place them in a sand bag, and walk facing away from the detonators and stretch the wires to their full length, being sure to not pull the detonators from the hole or sand bag. With the leg wires stretched to their fullest length, test the continuity of the detonators one at a time by un-shunting the leg wires and attaching them to the galvanometer and checking for continuity. After the test, re-shunt the wires by twisting the two ends together. Repeat this process for each detonator until all detonators have been tested. This process will be accomplished at least 50 feet from and downwind of any MEC or demolition materials and out of

the demolition range personnel and vehicle traffic flow pattern. In addition, all personnel on the demolition range will be alerted prior to the test being conducted.

NOTE: When testing the detonator, prior to connecting the detonator to the firing circuit, the leg wires of the detonator must be shunted by twisting the bare ends of the wires together immediately after testing. The wires will remain short circuited until time to connect them to the firing line or RFD Receiver.

- At the power source end of the blasting circuit, the ends of the wires will be shorted or twisted together (shunted) at all times, except when actually testing the circuit or firing the charge. The connection between the detonator and the circuit firing wires must not be made, unless the power end of the firing wires are shorted and grounded or the firing panel is off and locked.
- The firing line will be checked using pre-arranged hand signals or through the use of two-way radios, if the demolition pit is not visible from the firing point. If radios are used, communication will be accomplished a minimum of 50 feet from the demolition pit and detonators. The firing line will be checked for electrical continuity in both the open and closed positions, and will be closed/shunted after the check is completed.
- UXO/MEC to be detonated will be placed in the demolition pit and the demolition material placed/attached in such a manner as to ensure the total detonation of the UXO/MEC. Once the UXO/MEC and demolition material are in place and the shot has been tamped, the detonators will be connected to the det cord. Prior to handling any detonators that are connected to the firing line or RDF, personnel will ensure that they are grounded. The detonators will then be carried to the demolition pit with the end of the detonators pointed away from the individual. The detonators are then connected to the detonation cord, Non-El, etc., ensuring that the detonator is not covered with tamping material to allow for ease of recovery/investigation in the event of a miss-fire.
- Prior to making connections to the blasting machine or RFD Transmitter, the entire firing circuit will be tested for electrical continuity and ohms resistance, or transmitting power (as applicable), to ensure the blasting machine or RFD Transmitter (distance) has the capacity to initiate the shot.
- The individual assigned to make the connections at the blasting machine or panel will not complete the circuit at the blasting machine or panel, and will not give the signal for detonation, until satisfied that all personnel in the vicinity have been evacuated to a safe distance. When in use, the blasting machine, or its actuating device will be in the blaster's possession at all times. When using the panel, the switch must be locked in the open position until ready to fire, and the single key must be in the blaster's possession.
- Prior to initiating a demolition shot(s), a warning will be given; the type and duration of such warning will be determined by the prevailing conditions at the demolition range. At a minimum, this should be an audible signal using a siren, air horn, or megaphone, which is sounded for duration of one minute, five minutes prior to the shot and again one minute prior to the shot.

5.3 NON-EL USE (SHOCK TUBE)

The following requirements are necessary when using NON-EL (Shock Tube) systems:

- After cutting a piece of shock tube, either immediately tie a tight overhand knot in one or both cut ends or splice one exposed end and tie of the other.
- Always use a sharp knife or razor blade to cut shock tube so as to prevent the tube from being pinched or otherwise obstructed.
- Always cut shock tube squarely across and make sure the cut is clean.
- Use only the splicing tubes provided by the manufacturer to make splices.

- Every splice in the shock tube reduces the reliability of the priming system; therefore keep the number of splices to a minimum.
- Always dispose of all short cut off piece's in accordance with local laws as they relate to flammable material.

The shock tube system is a thin plastic tube of extruded polymer with a layer of PETN coated on its interior surface. The PETN propagates a shock wave, which is normally contained within the plastic tubing. The shock tube offers the controlled instantaneous action of electric initiation without the risk of premature initiation of the detonator by radio transmissions, high-tension power lines or by static electricity discharge. The NON-EL system uses detonators in the bunch blocks and in the detonator assembly, which are to be, handled in accordance with approved procedures.

The high reliability of the shock tube initiating system is due to the fact that all of the components are sealed and unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture and foreign contamination, therefore care must be taken to prevent moisture and foreign matter from getting in the shock tubes exposed ends.

5.3.1 SHOCK TUBE DEMOLITION PROCEDURES

WARNING
Although the detonation along the shock tube is normally contained within the plastic tubing, burns may occur if the shock tube is held.

SHOCK TUBE ASSEMBLY

- Spool out the desired length of shock tube from firing point to demolition site and cut it off with a sharp knife or razor blade. Weight down the lose end of trunk line.
- Immediately seal off the shock tube remaining on the spool by tying a tight overhand knot in the cut off end or use a push-over sealer.
- Using a sharp knife or razor cut the sealed end off of the detonator assembly.
- Push one of the shock tube ends to be spliced firmly into one of the pre-cut splicing tubes provided by the manufacturer at least ¼ inch. Push the other shock tube end firmly into the other end of the splicing tube at least ¼ inch. Secure splice with tape if needed.

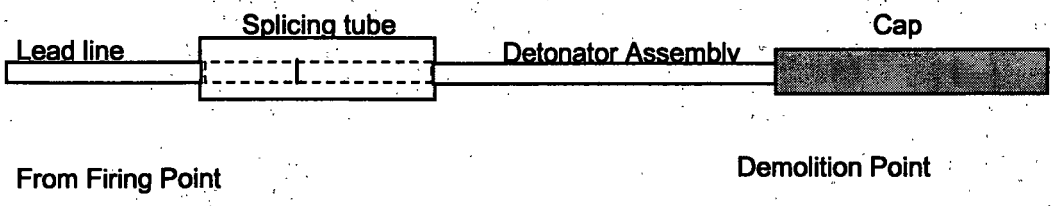

Figure 1

FIRING ASSEMBLY SET UP

- If there are multiple items to be destroyed using bunch block(s), supplied by the manufacturer, lay out lead lines at demo site to the shot(s) and secure the bunch block with a sandbag, or some other item which will keep it from moving.

Note: No more than six leads may be used from any one bunch block.

- If the detonator assembly has not been attached yet then using the splicing tube, splice the detonator assembly to the shock tube branch line as explained in the splicing instructions above.
- If this is a non-tamped shot place the detonator assembly into the demolition material. If the shot is to be tamped then prepare the demolition material with a detonating cord lead long enough to stick out of the tamping at least 1 foot.
- Tape the detonator assembly with cap to the detonating cord lead as shown in Figure 2.

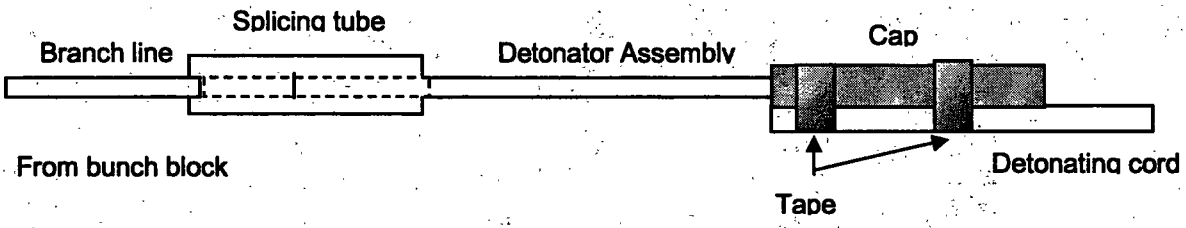

Figure 2

- Return to the firing position.
- Cut off the sealed end of shock tube, proceed to the directions listed in Step 7. If you are using a previously cut piece of shock tube, using a sharp knife or razor blade cut approximately 18 inches from the previously cut end, whether or not it was knotted in accordance with the above guidance.
- Insert a primer into the firing device and connect the shock tube lead line to the firing device ensuring that the shock tube is properly seated in the firing device.
- Take cover.
- Signal **"Fire in the hole"** three times and initiate charge.
- Observe a 5-minute wait time after the detonation.
- Remain in designated safe area until Demolition Supervisor announces **"All Clear".**

5.4 DETONATING CORD USE

The following procedures are required when using detonating cord (det cord):

- Det cord should be cut using approved crimpers, and only the amount required should be removed from inventory.
- When cutting det cord, the task should be performed outside the magazine.
- For ease of inventory control, only remove det cord in 1-foot increments.
- Det cord should not be placed in clothing pockets or around the neck, arm, or waist, and should be transported to the demolition location in either an approved "day box", original container, or a cloth satchel, depending upon the magazine location and proximity to the demolition area.
- Det cord should be placed at least 50 feet away from detonators and demolition materials until ready for use. To ensure consistent safe handling, each classification of demolition material will be separated by at least 25 feet until ready for use.

- When ready to "tie in" either the det cord to demolition materials, or det cord to detonator, the det cord will be connected to the demolition material and secured to the UXO/MEC. The cord is then strung out of the hole and secured in place with soil, or filled sandbags, being sure to leave a minimum of 6 feet of det cord exposed outside the hole.

- Once the hole is filled, make a loop in the det cord large enough to accommodate the detonator, place the detonator in the loop, and secure it with tape. The detonators explosive end will face down the det cord toward the demolition material or parallel to the main line.

- In all cases, ensure that there is a minimum of 6 feet of det cord extending out of the hole to allow for ease of detonator attachment and detonator inspection/replacement should a misfire occur.

- If the det cord detonators are electric, they will be checked, tied in to the firing line, and shunted prior to being taped to the loop. If the det cord detonators are non-electric, the time/safety fuse will be prepared with the igniter in place prior to taping the detonators to the det cord loop. If the det cord detonators are Non-El, simply tape the detonators into the loop as described above.

- In the event that a time/safety fuse is used, an igniter is not available, and a field expedient initiation system is used (i.e., matches), do not split the safety fuse until the detonator is taped into the det cord loop.

5.5 TIME/SAFETY FUSE USE

The following procedures are required when using a time/safety fuse:

- Prior to each daily use, the burn rate for the time/safety fuse must be tested to ensure the accurate determination of the length of time/safety fuse needed to achieve the minimum burn time of five minutes needed to conduct demolition operations.

- To ensure both ends of the time/safety fuse are moisture free, use approved crimpers to cut 6 inches off the end of the time/safety fuse roll, and place the 6 inch piece in the time/safety fuse container.

- If quantity allows, accurately measure and cut off a 6 foot long piece of the time/safety fuse from the roll.

- Take the 6 foot section out of the magazine, and attach a fuse igniter.

- In a safe location, removed from demolition materials and UXO/MEC, ignite the time/safety fuse, measure the burn time from the point of initiation to the "spit" at the end, and record the burn time in the SUXOS's Log.

- To measure the burn time, use a watch with a second hand or chronograph.

- To calculate the burn rate in seconds per foot, divide the total burn time (in seconds) by the length (in feet) of the test fuse.

- When using time/safety fuse for demolition operations, the minimum amount of fuse to be used for each shot will be the amount needed to permit a minimum burn time of five minutes.

5.6 DEMOLITION RANGE INSPECTION SCHEDULE

The schedule for the demolition range inspection will be followed when demolition operations are being conducted. This inspection will be conducted by the UXOSO or UXOQCS and will be documented in the Site Safety or QC Log. If any deficiencies are noted, demolition operations will be suspended and the deficiency reported to the SUXOS. Once the deficiencies are corrected, demolition operations may be resumed.

6.0 METEOROLOGICAL CONDITIONS

In order to control the effects of demolition operations and to ensure the safety of site personnel, the following meteorological limitations and requirements will apply to demolition operations:

- Demolition operations will not be conducted during electrical storms or thunderstorms.
- No demolition operations will be conducted if the surface wind speed is greater than 20 miles per hour.
- Demolition operations will not be conducted during periods of visibility of less than one mile caused by, but not limited to, dense fog, blowing snow, rain, sand storms, or dust storms.
- Demolition will not be carried out on extremely cloudy days, defined as overcast (more than 80% cloud cover) with a ceiling of less than 2,000 feet.
- Demolition operations will not be initiated until an appropriate time after sunrise, and will be secured at an appropriate time prior to sunset (see Section 5.0).

7.0 PRE-DEMOLITION/DISPOSAL PROCEDURES

7.1 PRE-DEMO/DISPOSAL OPERATIONAL BRIEFING

It is the belief of USAE that the success of any operation is dependent upon a thorough brief, covering all phases of the task, which is presented to all affected personnel. The SUXOS will brief all personnel involved in range operations in the following areas:

- Type of UXO/MEC being destroyed
- Type, placement, and quantity of demolition material being used
- Method of initiation (electric, non-electric, or NON-EL
- Means of transporting and packaging MEC
- Route to the disposal site
- Equipment being used (i.e., galvanometer, blasting machine, firing wire, etc.)
- Misfire procedures
- Post shot clean up of range

7.2 PRE-DEMO/DISPOSAL SAFETY BRIEFING

The USAE SUXOS, Team Leader, or UXOSO will conduct a safety brief for all personnel involved in range operations in the following areas:

- Care and handling of explosive materials
- Personal hygiene
- Two man rule, and approved exceptions
- Personnel rolls and responsibilities
- Potential trip/fall hazards
- Horse play on the range

- Stay alert for any explosive hazards on the range
- Calling a safety stop for hazardous conditions
- Location of emergency shelter (if available)
- Parking area for vehicles (vehicles must be positioned for immediate departure, with the keys in the ignition
- Location of range emergency vehicle
- Location of the assigned Paramedic
- Wind direction (to assess potential toxic fumes)
- Locations of first aid kit and fire extinguisher
- Route to nearest hospital or emergency aid station
- Type of communications in event of an emergency
- Storage location of demolition materials and MEC awaiting disposal
- Demolition schedule

7.3 TASK ASSIGNMENTS

Individuals with assigned tasks will report the completion of the task to the SUXOS. The types of tasks that may be required are:

- Contact local military authorities, fire personnel, and get air clearance, as required.
- Contact hospital/emergency response/medevac personnel, if applicable.
- Secure all access roads to the range area.
- Visually check range for any unauthorized personnel.
- Check firing wire for continuity and shunt.
- Prepare designated pits as required.
- Check continuity of detonators.
- Check time/safety fuse and its burn rate.
- Designate a custodian of the blasting machine, fuse igniters, or Non-El initiator.
- Secure detonators in a safe location.
- Place UXO/MEC in pit, and place charge in desired location.

7.4 PREPARING EXPLOSIVE CHARGE FOR INITIATION

To prepare the explosive charge for initiation, the procedures listed below will be followed:

- Insure firing wire is shunted.
- Connect detonator to the firing wire.
- Isolate or insulate all connections.
- Prime the demolition charge.
- Place demolition charge on UXO/MEC.
- Depart to firing point (if using non electric firing system, obtain head count, pull igniters, and depart to designated safe area).
- Obtain a head count.
- Give one minute warning signal, using a bullhorn or siren, five minutes prior to detonation, and again at one minute prior to detonation.
- Check the firing circuit.
- Signal **"fire in the hole"** three times (or an equivalent warning), and take cover.
- If using electric firing system, connect firing wires to blasting machine, and initiate charge.
- Remove firing wires from blasting machine and shunt or turn off RFD transmitter.
- Remain in designated safe area until SUXOS announces **"All Clear."** This will occur after a post-shot waiting period of 5 minutes and the SUXOS has and inspected the pit(s).

8.0 POST DEMOLITION/DISPOSAL PROCEDURES

Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so, and follow the procedures listed below:

- After the **"All Clear"** signal, check pit for low orders or kick outs.
- Examine pit, and remove any large fragmentation as needed.
- Back fill hole, as necessary.
- Police all equipment.
- Notify military authorities, fire, etc. that the operation is complete.

9.0 MISFIRE PROCEDURES

A thorough check of all equipment, firing wire, and detonators will prevent most misfires. However, if a misfire does occur, the procedures outlined below will be followed:

9.1 ELECTRIC MISFIRES

To prevent electric misfires, one technician will be responsible for all electrical wiring in the circuit. If a misfire does occur, it must be cleared with extreme caution, and the responsible technician will investigate and correct the situation, using the steps outlined below:

- Check firing line and blasting machine connections, and make a second initiation attempt.
- If unsuccessful, disconnect and connect to another blasting machine (if available), and attempt to initiate a charge.
- If unsuccessful, commence a 30-minute wait period.
- After the maximum delay predicted for any part of the shot has passed, the designated technician will proceed down range to inspect the firing system, and a safety observer must watch from a protected area.
- Disconnect and shunt the detonator wires, connect a new detonator to the firing circuit, check the replacement detonator for continuity, and prime the charge without disturbing the original detonator.
- Follow normal procedures for effecting initiation of the charge.

9.2 NON-ELECTRIC MISFIRES

Working on a non-electric misfire is the most hazardous of all operations. Occasionally, despite all painstaking efforts, a misfire will occur. Investigation and corrective action should be undertaken only by the technician that placed the charge, using the following procedure:

- If charge fails to detonate at the determined time, initiate a 60-minute wait period plus the time of the safety fuse, i.e., 5-minute safety fuse plus 60 minutes for a total of 65 minutes.
- After the wait period has expired, a designated technician will proceed down range to inspect the firing system. A safety observer must watch from a protected area.
- Prime the shot with a new non-electric firing system, and install a new fuse igniter.
- Follow normal procedures for initiation of the charge.

9.3 NON-EL MISFIRE

The use of a shock tube for blast initiation can present misfires, which require the following actions:

- If charge fails to detonate, it could be the result of the shock tube not firing. Visually inspect the shock tube; if it is not discolored (i.e., slightly black), it has not fired.
- If it has not fired, cut a 1 foot piece off the end of the tube, re-insert the tube into the firing device, and attempt to fire again.
- If the device still does not fire, wait 60 minutes and proceed down range to replace the shock tube per the instructions outlined below.
- If the tube is slightly black, then a "Black Tube" misfire has occurred, and the shock tube will have to be replaced, observe a 60 minute wait time. When replacing the shock tube, be sure to remove the tube with the detonator in place. Without removing the detonator from the end of the tube, dispose of by demolition.

9.4 DETONATING CORD MISFIRE

USAE uses det cord to tie in multiple demolition shots, and to ensure that electric detonators are not buried. Since det cord initiation will be either electrical or non-electrical, the procedures presented in Paragraphs 10.1, 10.2, or 10.3, as appropriate to the type of detonator used, will be used to clear a det cord misfire. In addition, the following will be conducted:

- If there is no problem with the initiating system, wait the prescribed amount of time, and inspect the initiator to the cord connection to ensure it is properly connected. If it was a bad connection, simply attach a new initiator, and follow the appropriate procedures in Paragraph 6.0.
- If the initiator detonated and the cord did not, inspect the cord to ensure that it is det cord and not time fuze. Also, check to ensure that there is PETN in the cord at the connection to the initiator.
- It may be necessary to uncover the det cord and replace it. This must be accomplished carefully, to ensure that the demolition charge and the MEC item are not disturbed.

10.0 RECORD KEEPING REQUIREMENT

To document the demolition operations procedures and the completeness of the demolition of MEC, the following record keeping requirements will be met:

- USAE (as directed) will obtain and maintain all required permits.
- The SUXOS will ensure the accurate completion of the logs, and the SUXOS and UXOQCS will monitor the entries in the log for completeness, accuracy, and compliance with meteorological conditions.
- The SUXOS will enter the appropriate data on the Ordnance Accountability Log and the Demolition Shot Record, to reflect the MEC destroyed, and will complete the appropriate information on the Explosives Accountability Log (a.k.a. the Magazine Data Card) which indicates the demolition materials used to destroy the MEC.
- The quantities of MEC recovered must also be the quantities of MEC destroyed or disposed.
- USAE will retain a permanent file of all demolition records, including permits; magazine data cards; training and inspection records; waste manifests, if applicable; and operating logs.
- Copies of ATF License and any required permits must be on hand.

11.0 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following safety measures and personal protective equipment (PPE) will be used in preventing or reducing exposure to the hazards associated with UXO/MEC demolition/disposal operations. These requirements will be implemented unless superseded by site-specific requirements stated in the SSHP.

- Hard hats are required only when working around heavy equipment or when an overhead or head impact hazard exists.
- Steel toe/shank boots are not required during surface/subsurface location of anomalies, unless a serious toe hazard exists, whereupon a fiber safety toe will be used.
- Safety glasses will be required whenever an eye hazard exists, for example, when working around flying dirt/debris, using hand tools, etc. Safety glasses will provide protection from impact hazards and, if necessary, ultraviolet radiation (i.e., sunlight).
- Positive means will be required to secure the PPE and prevent it from falling and causing an accidental detonation.

12.0 REGULATORY REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of UXO demolition/disposal operations:

- USAE Corporate Safety and Health Program
- OSHA General Industry Standards, 29 CFR 1910
- OSHA Construction Standards, 29 CFR 1926
- Basic Safety Concepts and Considerations for Ordnance and Explosives Operations, EP 385-1-95a
- USACE EM 385-1-1, Safety and Health Requirements Manual
- TP-16, Methodology for Calculation of Fragmentation Characteristics
- DoD 4160.21-M, Defense Reutilization and Marketing Manual
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- AR 385-64, U.S. Army Explosives Safety Program
- AR 385-10, Army Safety Program
- DA PAM 385-64, U.S. Army Explosives Safety Program
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- Applicable TM 60 Series Publications
- AR 190-11, Physical Security of Arms, Ammunition, and Explosives
- ATF 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- Applicable sections of DOT, 49 CFR, Parts 100 to 199, Transportation
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment

- AR 385-40 w/ USACE Supplement 1, Accident Reporting & Records

Chapter 4

STANDARD OPERATING PROCEDURE
DRUM AND CONTAINER HANDLING

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the conduct of operations involving the handling of drums or containers.

2.0 SCOPE

This SOP applies to all site personnel, including contractor and subcontractor personnel, and operations involved in the conduct of uncovering, inspecting, or handling of drums and containers. This SOP is not intended to contain all requirements needed to ensure regulatory compliance. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

This SOP does not apply to the Multiple Round Containers (MRCs) used for the storage of CWM.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with this SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

- OSHA General Industry Standard 29 CFR Part 1910.120; and
- USACE Engineer Manual 385-1-1.

4.0 RESPONSIBILITIES
4.1 PROJECT MANAGER

The Project Manager (PM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into the plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is trained and implemented in all drum and container handling operations. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings and that information related to its daily implementation is documented in the Site Daily Operational Log.

4.3 UXO TECHNICIAN III

The UXO Technician III (UXOTIII) shall be responsible for the field implementation of this SOP, and for implementing the safety and health requirements outlined in Section 5.0 of this SOP. In the absence of a SUXOS, the UXOTIII shall be responsible for implementing the SUXOS's responsibilities.

4.4 UXO SAFETY OFFICER

The UXO Safety Officer (UXOSO) will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the

daily tailgate safety briefings. The UXOSO will also be responsible for the daily inspection of site operations and conditions, to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

5.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in drum or container handling operations shall be familiar with the potential safety and health hazards associated with the conduct of these operations, and with the work practices and control techniques to be used to reduce or eliminate these hazards.

5.1 SAFETY HAZARDS AND OPERATIONAL CONTROL TECHNIQUES

This SOP is designed to provide site personnel with effective means of controlling the hazards encountered during the handling of drums and other waste containers encountered or generated during hazardous waste site operations. This SOP also outlines the effective engineering controls, safe work practices, and personal protective equipment (PPE) to be used in drum/container handling. This SOP shall be applicable to site operations where the handling of drums and containers is required during the conduct of site activities, as outlined in the Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP). These procedures apply to both hazardous waste drums/containers discovered on site and drums/containers of waste generated during site activities.

5.2 GENERAL REQUIREMENTS

The following generalized requirements shall be followed or incorporated during the discovery, inspection, transportation, and disposal of drums/containers of hazardous substances and waste:

- Prior to handling drums or containers, all employees shall be warned of the potential physical and chemical hazards associated with the contents and the handling of the drums or containers;
- Drums/containers used for the collection or transfer of waste materials shall meet the appropriate Department of Transportation (DOT), OSHA, and U.S. Environmental Protection Agency (USEPA) regulations for the wastes that they contain;
- The SUXOS and UXOSO will coordinate to organize drum/container operations in order to minimize the amount of drum or container movement;
- Unlabeled drums and containers located on site shall be considered to contain hazardous substances, and handled accordingly until the contents are positively identified and labeled;
- Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound, approved container using a device classified for the material being transferred;
- Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, shall be on hand and ready to use to control incipient fires;
- Material handling equipment used to transfer drums and containers shall be selected, positioned, and operated in such a manner as to minimize sources of ignition related to the equipment from igniting flammable gases and vapors;
- Where an air line respirator system is used for any drum/container-related activity, connections to the source of air supply shall be protected from contamination and the entire system shall be protected from physical damage; and

- The flow chart found in Figure 1 will be used as a guide to direct the course of drum/container handling, sampling, staging, bulking, and shipment procedures outlined in this SOP.

5.3 LOCATION AND REMOVAL OF BURIED DRUMS/CONTAINERS

To ensure the safety and health of on-site workers, the environment, and the general public, extreme caution shall be used when buried drum/containers are located and removed. Therefore, whenever site operations require the location and removal of buried drums/containers, the procedures listed below shall be followed:

- A magnetometer or other type of detection device shall be used to estimate the location and depth of buried drums or containers;
- Soil or other material shall be removed with caution to prevent drum or container rupture;
- When necessary, an observer will be stationed so as to assist the heavy equipment operator, and to direct the operator in the movement of the bucket during removal of soil or covering material;
- Excavation of soil to expose buried drums/containers shall be conducted in accordance with the provisions of the Excavation and Trenching SOP; and
- If an excavation must be entered by site personnel to facilitate soil removal, inspect the drum/container, rig the drum/container for lifting, or for any other reason, the UXOSO shall evaluate the excavation to ensure conditions are safe for entry, and to determine whether the requirements of the Confined Space Entry SOP must be implemented.

5.4 INSPECTION OF DRUMS AND CONTAINERS

Selection of drum handling, sampling, and transportation procedures depends largely upon the contents and condition of the drum/container. Therefore, to the extent feasible, drums and containers shall be inspected prior to any handling, to gain as much information as possible related to their integrity and contents. When assessing drum/container condition and integrity, the following items should be inspected and carefully documented:

- Signs of structural deterioration, such as corrosion, rust, or leaks; and
- Signs that the drum is under pressure, such as swelling or bulging.

When inspecting drums/containers to determine their possible contents, the following should be examined:

- Symbols, words, or other marks indicating the nature of its contents (e.g., radioactive, flammable, corrosive, etc.);
- Symbols, words, or other markings indicating that the contents may be discarded laboratory chemicals, reagents, or other small size containers (< 5 gallons each) that are packaged together; and
- The configuration of the drumhead and the drum material (see Tables 1 and 2).

TABLE 1: DRUM CONFIGURATION

CONFIGURATION	INFORMATION

Whole lid removable	Drum designed to contain solid materials.
Lid has a bung	Drum designed to contain liquids.
Drum contains a polyethylene or PVC liner	Drum may contain highly corrosive or volatile organic materials.

TABLE 2: DRUM HAZARDS

DRUM MATERIAL	ASSOCIATED HAZARDS
Polyethylene or PVC-Lined Drums	Often contain strong acids or bases, or volatile organic materials.
Exotic Metal Drums (e.g. nickel, stainless steel, aluminum)	These drums are usually very expensive and are designed to contain extremely dangerous materials.
Single-walled Pressure Vessels	These containers have fittings for both product filling and placement of an inert gas, such as nitrogen. They may contain reactive, flammable, or explosive materials.
Laboratory Packs	These are used for disposal of expired chemicals and process samples from laboratories, hospitals, and other similar institutions. Individual containers inside are often packed in absorbent/protective material. Lab packs may contain a large variety of materials that may or may not be compatible when stored or mixed together, such as: flammable, shock-sensitive, highly-corrosive, highly-volatile, radioactive, or extremely toxic materials.

Drums that do not have exterior labeling indicating their contents must be assumed to contain hazardous materials, until characterized through sampling. Drums or containers that cannot be inspected before being moved because of storage conditions (e.g., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile) shall be moved to an accessible location and inspected prior to further handling.

5.5 OPENING DRUMS AND CONTAINERS

The act of opening a drum with unknown contents can present serious safety and health hazards. This activity requires management and site personnel to take the most conservative and protective means feasible to ensure protection of site personnel, the environment, and the general public. The guidelines following represent the minimum requirements to be followed during drum/container opening, and may need to be amended based on updated site characterization data:

- Employees not actually involved in opening drums or containers shall be kept a safe distance and, if possible, upwind from the drums or containers being opened;
- If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the employee and the drums or containers being opened to protect the employee, in the case of accidental spill or explosion;
- Controls for drum- or container-opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier;
- When there is a reasonable possibility of flammable atmospheres being present, monitoring shall be conducted to assess the atmosphere and material-handling equipment, and hand tools shall be of the type to prevent sources of ignition;
- Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved, without the potential of worker exposure;

- If pressure cannot be relieved from a remote location, appropriate shielding shall be placed between the worker and the drums or containers to reduce the risk of employee injury;
- Whenever feasible, or if required by known hazards, remote container opening equipment (see Table 3) will be used, and the operation will be conducted in a containment vessel designed to minimize the effects of a pressurized release or explosion; and
- Employees shall not stand upon or work from drums or containers.

5.6 HANDLING RADIOACTIVE WASTES

Drums and containers containing radioactive wastes shall not be handled until their hazard to personnel is properly assessed. This assessment of the hazards shall include determining the levels of radioactivity, the type of radioactive material expected, and the potential for exposure during handling, sampling, or transfer operations.

TABLE 3: DRUM-/CONTAINER-OPENING DEVICES

REMOTE CONTROLLED DEVICE	USE
Pneumatically powered impact wrench	Designed to remove drum/container bungs
Hydraulically or pneumatically operated drum or container piercer	Punctures the top of the drum/container
Backhoe bucket equipped with a non-sparking spike	Punctures the top of the drum/container
Pneumatically, hydraulically, or electrically operated de-header	Cuts the top off of a drum, allowing full access to the contents (usually used on drums of solids)

If deemed necessary by the CIH, the hazard assessment of radioactive waste drums/containers and exposure potential shall be conducted by a Certified Health Physicist, or other person with sufficient education and experience to make such an assessment.

5.7 HANDLING SHOCK-SENSITIVE WASTES

Shock-sensitive waste presents a serious threat to site workers due to the potential for explosion during drum/container opening, sampling, or handling operations. As a minimum, the following special precautions shall be taken when drums and containers containing, or suspected of containing, shock-sensitive wastes are handled:

- All non-essential employees shall be evacuated from the area prior to any operations, such as handling, opening, sampling, or transfer;
- Material-handling equipment shall be supplied with explosive containment devices or protective shields, to protect equipment operators from exploding containers;
- An employee alarm system capable of being perceived above surrounding light and noise conditions shall be used to signal the commencement and completion of shock-sensitive waste handling activities;
- Continuous communications (e.g., portable radios, hand signals, telephones, etc.) shall be maintained between the site personnel handling the shock sensitive drums/containers and the UXOSO/Site Safety and Health Officer (SSHO) and site supervisor, located in the support zone, until such time as the handling operation is completed;

- Communication equipment or methods which could cause shock-sensitive materials to explode shall not be used; and
- Drums and containers containing packaged laboratory wastes shall be considered to contain shock sensitive or explosive materials, until they have been characterized.

Caution: Shipping of shock sensitive wastes may be prohibited under U.S. Department of Transportation regulations. Employers and their shippers should refer to 49 CFR 173.21 and 173.50.

5.8 HANDLING OF PRESSURIZED DRUMS/CONTAINERS

Pressurized drums/containers, as evidenced by bulging or swelling, are extremely dangerous and, whenever possible, should not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the material. To minimize the hazards associated with pressurized drums/containers, the following shall be observed and/or implemented:

- If a pressurized drum/container must be moved, it will, whenever possible, be handled with a grappler unit designed for explosive containment.
- Pressurized drums/containers shall be moved individually, only as far as is needed to set them on solid ground, where they can be further assessed.
- Special engineering controls designed for splash/explosion containment shall be utilized when the pressure is released from the drum/container prior to sampling activities.
- Overpack drums, first aid kits, and fire extinguishers shall be staged near the area where pressurized drums are inspected and stored.

5.9 HANDLING LABORATORY WASTE PACKS

In addition to the requirements of Paragraph 5.4 of this SOP, the following precautions shall be taken, as a minimum; in handling laboratory waste packs (lab packs):

- Lab packs shall be opened only when necessary, and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack, according to the hazards of the wastes;
- If crystalline material is noted on any container, the contents shall be handled as a shock-sensitive waste until the contents are identified;
- Once a lab pack has been opened, a chemist or other person familiar with the identification and classification of waste chemicals shall inspect and segregate the containers inside;
- Overpack drums, first aid kits, and fire extinguishers shall be staged near the area where pressurized drums are inspected and stored; and
- Whenever possible, lab packs should be initially handled using a grappler unit designed for explosive containment.

5.10 SAMPLING OF DRUM/CONTAINER CONTENTS

Drum/container sampling shall be done in accordance with the sampling protocols and procedures outlined in the Work Plan (WP) or SSHP. The drum and container sampling protocols and procedures should be written to meet the requirements of the Statement of Work (SOW) and any applicable USEPA sampling protocols. Along with the requirements found in the WP or SSHP, the following shall be implemented, as applicable:

- Whenever feasible or necessary, drums/containers will be sampled in place, or moved a minimal distance to a sampling staging area;
- All sampling and safety equipment shall be ready and available prior to initiating sampling activities;
- Sampling personnel shall remain at a safe distance from the drum/container opening area while opening is being conducted, and shall enter the area only after opening operations are complete;
- Whenever feasible, remote drum-/container-sampling equipment will be used to prevent site personnel from having to contact the drum/container; and
- Samplers shall not stand on or lean over the drum/container while sampling.

5.11 DRUM/CONTAINER STAGING

The staging of drums/containers is a critical element of the drum-/container-handling procedure. If staging is necessary due to the location or number of drums/containers, a staging SOP shall be implemented, which outlines the movement patterns and temporary staging areas to be used as the drums/containers are processed. Prior to drum/container handling, the UXOSO shall develop a site staging map (see Figure 2 for an example of a staging map) which will identify the location of the various staging areas around the site.

Along with the requirements outlined above, the following shall be implemented when drum/container staging is required:

- Drum or container staging areas shall be kept to the minimum number necessary to identify and classify materials safely and prepare them for transport;
- Staging areas shall be provided with adequate access and egress routes;
- A system shall be developed for identifying/marking drums/containers as they are moved from one staging area to the next; and
- Drums/containers shall not be moved from one staging area to the next until all of the necessary tests/procedures for the staging area have been accomplished.

5.12 BULKING OF DRUM/CONTAINER CONTENTS

Bulking is the process whereby similar wastes from individual drums/containers are combined into larger containers to facilitate shipment and disposal activities. Since materials from a number of containers will be mixed together, it is imperative that the materials be of a compatible nature. This is due to the fact that the mixing of incompatible materials can cause chemical reactions resulting in fire, explosion, or the liberation of toxic and flammable gases/vapors. Therefore, the bulking of hazardous wastes shall be permitted only after the UXOSO has consulted with the USAE Certified Industrial Hygienist to determine which materials can be combined together.

5.13 SHIPPING AND TRANSPORTATION

All hazardous waste drums/containers to be shipped off site shall be handled according to the procedures specified below:

- Drums and containers shall be identified and classified prior to packaging for shipment;
- All hazardous waste shall be contained and/or packaged in DOT-approved drums/containers;

- All drums/containers shall be labeled in accordance with USEPA and DOT requirements, prior to shipping;
- Site personnel shall use drum dollies, pallets, and fork trucks, as appropriate, to facilitate the loading of drums/containers onto transport vehicles; and
- All required documentation, such as the USEPA-required Uniform Hazardous Waste Manifest (USEPA Form 8700-22), shall be prepared and available to the transporter prior to loading.

5.14 TANK AND VAULT PROCEDURES

Tanks and vaults found on site require special consideration due to their size, configuration, and the potential quantity of material which may be stored in them. To ensure that tanks and vaults found on-site are handled safely, the following shall be implemented:

- Tanks and vaults containing hazardous substances shall be sampled and handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault;
- Appropriate tank or vault entry will be conducted in accordance with procedures described in the Confined Space Entry SOP, whenever employees must enter a tank or vault; and
- All slings, chokers, cables, etc. used for lifting or securing tanks/vaults shall be inspected prior to use, and the load/configuration capacity shall be identified and not be exceeded.

5.15 SPILL PREVENTION

Due to the potential for spills, which may result from handling deteriorated drums/containers, spill containment and collection equipment shall be located on site prior to initiating drum and container handling activities. To ensure that a spill will be contained and cleaned up safely, the following shall apply:

- DOT-specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur;
- Where major spills may occur, spill containment procedures, which are part of the Emergency Response Plan found in the SSHP, shall be implemented to contain and isolate spilled materials; and
- If flammable or explosive materials could be spilled, spill clean-up materials shall be spark-proof, and all ignition sources shall be removed or extinguished prior to personnel engaging in clean-up activities.

5.16 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following safety measures and personal protective equipment (PPE) shall be used in preventing or reducing exposures associated with drum and container handling operations. Personnel will wear the type and level of PPE specified in the SSHP.

- Personal and work area monitoring for radiological hazards and toxic gases, vapors, and dusts will be conducted as specified in the SSHP for drum and container operations, and in SOP;
- Personnel entering tanks or vaults will wear the retrieval and safety equipment specified in the Confined Space Entry SOP; and

- All provisions and requirements specified in other SOP's, which apply to drum and container handling operations (e.g., excavation and trenching, heavy equipment operation), shall be followed.

6.0 ATTACHMENTS

Figure 1: Drum and Container Handling Flow Chart

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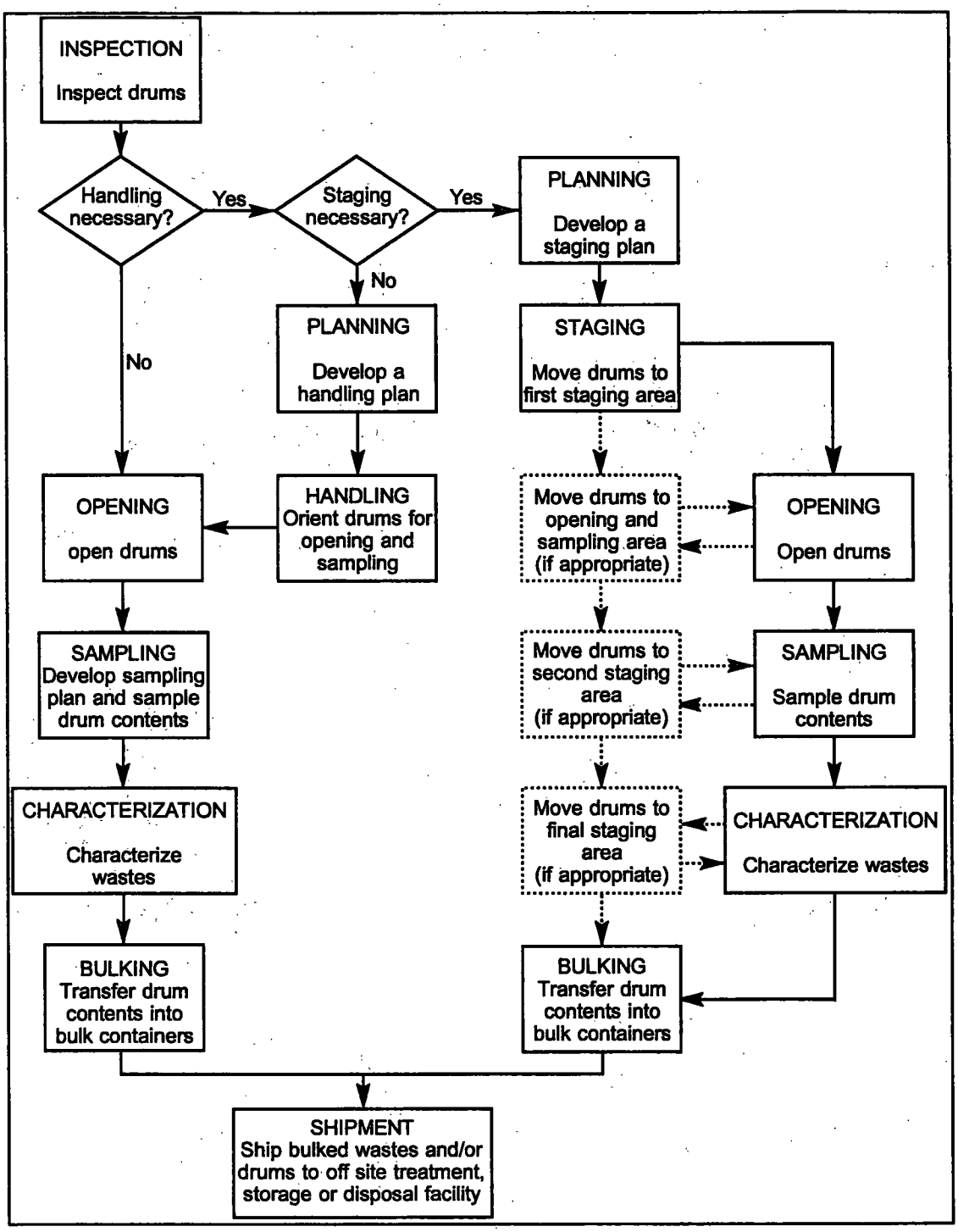
FIGURE 1: DRUM AND CONTAINER HANDLING FLOW CHART



Chapter 5

STANDARD OPERATING PROCEDURE
EQUIPMENT AND VEHICLE SAFETY

1.0 OBJECTIVE

Motor vehicle usage presents the most significant work risk to employees. The United States Bureau of Labor Statistics indicates that motor vehicle deaths and injuries continue to be the number one cause of work-related death and serious injury. Accordingly, it is essential that an effective vehicle safety program be instituted for the safety and well being of project personnel and the public at large.

2.0 PURPOSE

This section establishes requirements for safe operation of vehicles and equipment. This procedure is an overview of the guidelines in the proposed Occupational Safety and Health Administration (OSHA) Motor Vehicle Safety Standard.

3.0 RESPONSIBILITIES

3.1 DRIVER/OPERATOR

The driver of USA Environmental, Inc. (USAE) or subcontractor owned, rented, or leased vehicle is responsible for:

- Maintaining the appropriate license/permitting/certification for operating project vehicles/equipment;
- Operating vehicles and equipment in a safe and legal manner;
- The safety of passengers; and
- Reporting immediately any motor vehicle or piece of equipment that is found to be defective or not operating properly.

3.2 UXO SAFETY OFFICER/SITE SAFETY AND HEALTH OFFICER

The UXO Safety Officer/Site Safety and Health Officer (UXOSO/SSHO) is responsible for the following:

- Ensuring that all vehicle accident reports are processed and the required number of copies submitted to local, state, and federal agencies, to the resource manager and to the insurance carrier.
- Ensuring that appropriate individuals, beginning with the Corporate Safety and Health Manager (CSHM) are notified by telephone of accidents that involve fatalities or multiple serious injuries.
- Verifying that all accidents are documented and investigated, to include local, county, or state law enforcement as required. The investigation should be of sufficient depth to determine the cause and action required to prevent recurrence. Copies of all investigations shall be forwarded to the CSHM.
- Ensuring that during the selection process for leased or purchased vehicles, consideration is given to obtaining vehicles with essential safety devices. Such devices include anti-locking brakes, air bags, both front and rear seat shoulder harnesses, and all season traction tires. Motor vehicles must be equipped with first aid kits. Shoulder safety belts must not be attached to doors.

3.3 HEAVY EQUIPMENT OPERATOR

The heavy equipment (i.e., backhoe or trackhoe) operator is responsible for inspecting the equipment before each shift to assure that the following parts, safety equipment, and accessories are in a servicable condition and free of apparent damage that could cause failure while in use:

- Service brakes, including trailer brake connections;
- Parking system (hand or foot brake);
- Emergency stopping system (brakes);
- Tires;
- Horn;
- Steering mechanism;
- Coupling or PTO devices;
- Seat belts;
- Operating controls; and
- Safety devices.

4.0 DEFECTS

All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, or similar devices, where such equipment is necessary.

5.0 SEAT BELTS

OSHA has determined that the use of seat belts in motor vehicles can significantly reduce the seriousness of occupational motor vehicle accidents. Accordingly, all USAE and subcontractor employees driving motor vehicles on this project (including rental cars, pick-up trucks, etc.) will ensure that all occupants use seat belts, both shoulder and lap belts s designed.

6.0 STATE AND LOCAL LAWS

- Drivers shall operate vehicles in accordance with the law.
- Drivers shall not operate vehicles that are known to be defective or not in compliance with the operators manual or state law.
- Drivers are personally liable and responsible for the consequences of state and community violations. USAE does not endorse the unlawful use of vehicles.
- The use of devices designed to identify active police speed detection systems (i.e., radar detectors) is prohibited in all USAE and subcontractor owned, leased, and rented vehicles, and in personal vehicles used for company compensated business travel.

7.0 SAFE DRIVING PRACTICES

- Personnel shall operate vehicles in a defensive manner, (i.e., always be on the alert and trying to anticipate what might occur under the existing conditions and driving in such a manner as to avoid hazards or hazardous situations).
- Personnel operating vehicles shall be considerate of, and courteous to, the traveling public and/or pedestrians and should yield the right-of-way to avoid accidents.
- Personnel shall drive at speeds consistent with posted speed limits and prevailing conditions, such as weather, traffic, and road conditions.
- Personnel shall drive at all times with sufficient space around the vehicle to provide time to see conflicts arising, to react quickly, and to stop. These five keys to defensive driving will help accomplish a good space cushion.
    1. Aim high in steering;
    2. Get the big picture;
    3. Keep your eyes moving;
    4. Leave yourself an out; and
    5. Make sure they see you.

8.0 GENERAL SAFETY RULES

- **Blind Curves** - Slow down and sound horn when approaching a blind curve.
- **Driver's License** - Operation of a vehicle without a valid operator's license is prohibited. Personnel operating vehicles regulated by the United States Department of Transportation (DOT) shall have a current commercial driver's license (CDL).
- **School Buses** - Obey school bus laws. Slow down and prepare to stop when approaching school buses and children on foot or on bicycles.
- **Emergency Vehicles** - Give ambulances, fire fighting equipment, police vehicles, and other emergency vehicles the right-of-way during emergencies and lend assistance if required.
- **Gasoline** - Gasoline and other flammable/combustible liquids shall not be carried in or on vehicles other than in permanent gas tanks or in UL approved safety cans. UL approved safety containers must be properly secured against unwanted movement when being carried in the back of pick-up trucks.
- **Laws and Regulations** - Learn and obey all local, state, and federal laws.
- **Parking** - Equipment and vehicles shall be parked off roads and highways whenever possible. When it is not possible, the vehicle shall be marked by red lights, warning triangles, or flares at night and red flags or warning triangles during the day. Wheels should be blocked or chocked.
- **Passing** - Do not pass when visibility is restricted for any reason.
- **Pedestrians** - Be constantly alert for pedestrians and remember they have the right-of-way.
- **Slow Down** - Slow down and use caution at blind intersections and crossings when visibility is limited or when passing work crews.

- **Speeding** - Speeding is strictly prohibited. Observe posted speed limits.
- **Visibility** - Make sure all windshields, side and rear windows, mirrors, and lights are clean before moving vehicles.
- **Warning Signs and Traffic Signals** - Be alert for and strictly obey all directional and warning signs and signals.
- **Seat Belts** - Operator and passengers must keep seat belts fastened at all times when the vehicle is in motion.

9.0 DOT REGULATED VEHICLES/EQUIPMENT

- **Commercial Driving License.** All USAE and subcontractor personnel operating a DOT regulated vehicle must hold a valid CDL from their state of residence.
- **Backing Up** - Never start or back up equipment or vehicles until you are sure the way is clear. If necessary, have another person guide you safely. Back up alarms, when required, must be working and audible over the surrounding noise.
- **Ear Protection** - Ear plugs or other approved ear protection shall be worn when necessary. Use of ear plugs in cars or trucks on public highways may be against local laws.
- **Fueling and Repair** - No fueling or repair shall be made to equipment while it is in operations. The motor shall be turned off and the bucket, blade, gate, or boom shall be lowered to the ground or blocks.
- **Housekeeping** - Operators should keep deckplates, steps, rungs, and hand rails on equipment free of grease, oil, ice, and mud. The inside of the cabs shall also be kept clean and free of flammable items.
- **Inspections**- Equipment and vehicles shall not be used until known defects or discrepancies are corrected. Inspections shall be made at the start of each shift and defects or discrepancies shall be reported to the supervisor immediately.
- **Jumping** - Jumping on or off equipment is prohibited. When climbing on or off equipment or vehicles, face the unit and use secure hand and foot holds to prevent slips and falls. Always look where you are stepping.
- **Know Your Equipment or Vehicle** - It is your responsibility to be thoroughly familiar with all features and manuals and if you are in doubt as to correct operating techniques or safety features, ask your supervisor at once.
- **Overloading** - Avoid overloading vehicle beds and equipment buckets and beds. Excessive material can damage the unit and falling material can cause serious injury.
- **Power Lines** - When operating trucks, cranes, shovels, or other units, always use caution around power lines and maintain a minimum safe clearance of 10 feet or more depending upon the voltage.
- **Riders** - Only authorized persons will be permitted to ride in equipment or vehicles.
- **Securing Loads** - The operator of the vehicle is responsible for ensuring that their load is secure and will not shift during transport.

- **Long Hauls** - On long hauls, binders should be checked periodically (at least during each rest or service stop) to make sure they are still secure and tight.
- **Overhanging and Oversize Loads** - When it is necessary to transport overhanging or oversize loads, the appropriate signs and red flags and red lights will be used. When necessary, use flag cars.
- **Safety Chains** - Safety chains of sufficient size and strength shall be installed on all trailers being towed.
- **Safety Hooks** - Use safety hooks with latches on all winch truck cables.
- **Side Roads and Railroad Tracks** - Stop and look both ways before crossing railroad tracks or before driving onto a highway from a side road.
- **Stopping** - Do not stop vehicles in the middle of the road to talk to occupants in another vehicle. Always pull to the side or off the road to maintain a clear, safe road.
- **Turn Signals** - Always use turn signals, emergency and other signals as appropriate when turning, stopping, passing, or performing other vehicle operations.
- **Vehicle Maintenance** - It is the driver's responsibility to see that his vehicle is in good mechanical condition before and during operation. Special emphasis should be placed on ensuring the brakes, lights, horn, windshield wiper, tires, and steering assembly are in good order. Defects must be reported and corrected immediately.

Chapter 6

STANDARD OPERATING PROCEDURE – OPS-06
EXCAVATION AND TRENCHING

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide all USA Environmental, Inc. (USAE) employees and subcontractors the minimum safety and health requirements and procedures applicable to the conduct of operations involving excavation or trenching.

2.0 SCOPE

This SOP applies to all site personnel, including contractor and subcontractor personnel, and operations involving soil excavation or trenching. This SOP is not intended to contain all of the requirements needed to ensure regulatory compliance. Consult the documents listed in Section 5.0 of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES
3.1 PROJECT MANAGER

The Project Manager (PM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into the plans, procedures, and training for sites where this SOP is to be implemented.

3.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is trained and implemented in excavation or trenching operations. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operational Log.

3.3 UXO TECHNICIAN III

The UXO Technician III (UXOTIII) shall be responsible for the field implementation of this SOP, and for implementing the safety and health requirements outlined in Section 4.0 of this SOP. In the absence of a SUXOS, the UXOTIII shall implement the responsibilities outlined in Section 3.2.

3.4 UXO SAFETY OFFICER

The UXO Safety Officer (UXOSO) will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the daily tailgate safety briefings. The UXOSO will also be responsible for daily inspection of site operations and conditions, to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

3.5 TRENCHING AND EXCAVATION-COMPETENT PERSON

A trenching and excavation-competent person is one who is knowledgeable of Occupational Safety and Health Administration (OSHA) requirements and, by virtue of experience or training, is capable of identifying existing and predictable hazards in the surroundings or working conditions, and is authorized to take corrective actions. This person may be the UXOSO, a registered professional engineer, or other site personnel with the appropriate knowledge and experience needed to accurately assess trenching/excavation hazards. The competent person will be responsible for inspecting the

trenching/excavation when employee exposure to potential hazards can be reasonably expected. The inspection shall be conducted daily prior to personnel entry into the trench/excavation site, and after every rainstorm or other hazard-increasing occurrence. The competent person shall complete the Daily Excavation Checklist each time the excavation is inspected, and a copy of the inspection will be posted at the excavation site.

4.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in excavation or trenching operations shall be familiar with the potential safety and health hazards associated with the conduct of this operation, and with the work practices and control techniques to be used to reduce or eliminate these hazards.

4.1 SAFETY HAZARDS AND OPERATIONAL CONTROL TECHNIQUES

The safety and health hazards and operational control techniques to be used during conduct of excavation or trenching operations are discussed below:

- Prior to initiation of any excavation or trenching activity, the location of underground utilities and installations shall be determined.
- When the excavation/trench achieves a depth of 5 feet below ground surface (ft bgs), a competent person shall inspect the excavation or trench prior to entry by personnel, to determine if there are any indications that a cave-in could occur.
- An excavation or trench greater than 5 ft bgs or deeper shall be inspected daily, by a competent person, prior to commencement of work activities.
- Evidence of cave-ins, slides, sloughing, fissures, water seepage, bulging, undercutting, tension cracks, or similar conditions will be cause for work to cease until necessary precautions are taken to safeguard workers.
- Excavations 5 ft bgs or deeper will be sloped at an angle of one and one half horizontal to one vertical (34 degrees measured from the horizon).
- Excavations 5 ft bgs or deeper, which can not be sloped as specified in the bullet item above, shall require a registered engineer to design the sloping/benching/support system.
- Protective systems shall be selected from OSHA 29 CFR 1926, Subpart P, and/or designed by a registered professional civil engineer.
- Spoils and other materials shall be placed a least 2 feet from the edge of the excavation.
- Materials used for sheeting, shoring, or bracing shall be in good condition.
- Timbers shall be sound, free of knots, and of appropriate dimensions for the trench.
- Safe access shall be provided into the excavation(s) by means of a gradually sloped personnel access/egress ramp, or ladders or stairs will be provided.
- Ladders used shall extend 3 feet above grade level, and be secured from movement.
- Excavations 4 ft bgs or deeper shall have a means of egress at a frequency, such that lateral travel to the egress point does not exceed 25 feet.
- Walkways or bridges with standard guardrails shall be provided, where employees are required or permitted to cross over excavations.
- The excavation or trench shall be inspected by the UXOSO, to determine if it meets the criteria for a confined space.
- Accumulated water inside an excavation shall be removed prior to personnel entry.
- If an excavation or trench is determined to be a confined space, the requirements set forth in the Confined Space Program SOP, Corporate Safety and Health Program shall apply, as well as the requirements of 29 CFR 1910.146 and EM 385-1-1.
- All excavations or trenches shall be properly barricaded or flagged off, to prevent personnel from accidentally falling into the excavation or trench.

- In accordance with the requirements of 29 CFR 1926.651(g), if an excavation or trench is greater than 4 ft bgs, and the potential exists for having a hazardous atmosphere inside the excavation or trench, then the atmosphere shall, as a minimum, be tested for oxygen deficiency and toxicity prior to entry by site personnel.

4.2 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Personnel shall wear the appropriate level of protection, as specified in the Site Safety and Health Plan. The personal protection equipment (PPE) outlined in the Site Safety and Health Plan will have been selected in accordance with the chemical and physical hazards anticipated for the given task, and will comply with the PPE SOP. Additionally, no site personnel shall enter a trench or excavation site until it has been inspected by a competent person, and all safety- and health-related precautions and controls have been implemented.

5.0 REGULATORY REFERENCES

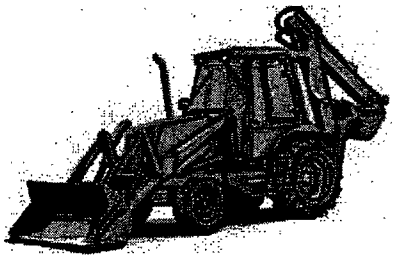
The following OSHA standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with this SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

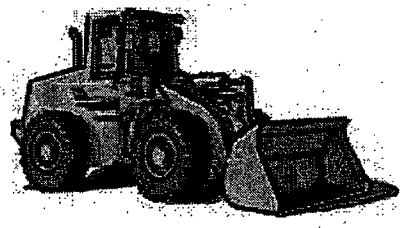
- OSHA Construction Industry Standard 29 CFR, Part 1926, Subpart P, Applicable Sections
- USACE Engineer Manual (EM) 385-1-1, Section 25
- USAE Corporate Safety and Health Program

6.0 ATTACHMENTS

- Backhoe Operational Procedures
- Backhoe Safety Checklist
- Trenching and Excavations Checklist

BACKHOE OPERATIONAL PROCEDURES





BEFORE USING THE MACHINE

- Read the owner's manual to learn the characteristics of your machine.
- For your personal protection you will need to wear some or all of the following:
  - sturdy pants and shirt
  - safety shoes
  - hard hat
  - safety goggles or glasses
  - gloves
  - hearing protection
  - respirator for dusty conditions
- Sunscreen protection is vital in bright sunshine if not under a roof.
- Check the loader/backhoe for the presence of the following safety devices in good working order:
  - rollover protective structure (ROPS)
  - seat belt (if ROPS equipped)
  - guards
  - shields
  - backup warning system
  - lights, and mirrors
- Fill the fuel tank while engine is off and cool. Never fill inside a building. Do not smoke. Wipe up any spills immediately.
- Check the machine daily for broken, missing, or damaged parts. Make the necessary repairs or replacements.
- Keep the machine clean -- especially steps, hand rails, pedals, grab irons, and floor of the cab. Slippery surfaces are very hazardous.
- Remove or secure loose items in the cab that could interfere with operating the controls.
- Check the work area for hidden holes, obstacles, drop-offs, etc. Clear children, pets, and bystanders from the area.
- Check overhead for utility lines, roofs, and other obstacles.
- Request Blue Stake service to locate underground cables, gas lines, water, and sewer lines before digging. You need to request this service in advance.
- Always use the hand rails, ladders, and steps provided when mounting the machine; never grab controls or the steering wheel.
- The cab was designed for one person -- allow no riders, especially children.

OPERATING THE LOADER

- Adjust the seat, fasten the seat belt, set the brake, and place transmission in park or neutral before starting the engine.
- If machine is in a garage be sure ventilation is adequate. CARBON MONOXIDE KILLS!
- Start the engine and check all controls for proper function. Check horn and backup alarm. Do not use if anything is faulty.
- If the backhoe is still attached, be sure to use chains and locks to prevent it from swinging.

- If the backhoe is removed, you may have to use counterweights. Check your owner's manual.
- Keep the working area as level and clean as possible. Use the bucket to grade the area frequently.
- Always carry the bucket low for good visibility and maximum stability.
- Use extreme caution when backfilling to avoid collapsing the wall of the trench.
- When undercutting high banks or material piles be alert for falling rocks and/or cave-ins.

OPERATING THE BACKHOE

- Keep the loader bucket on the ground.
- Level the machine for maximum stability.
- Operate the backhoe only from the seat.
- Never swing the bucket over a truck cab.
- Dump the bucket uphill if possible when operating on a slope. If you must dump downhill swing slowly to avoid tipping the machine.
- If using the backhoe as a hoist, do so with the weight over the back of the machine -- NEVER THE SIDE – to avoid tipping.
- Be sure the load you are lifting is balanced, and move the boom slowly to avoid swaying the load.

SAFE STOPPING PROCEDURE

- Park the machine on level ground if possible and set the parking brake. Place transmission in park if so equipped.
- Lower the loader and backhoe buckets to the ground.
- Stop the engine and remove the key.
- Work the hydraulic controls to relieve pressure.
- Wait until all motion has stopped and then dismount carefully using steps and safety holds. Do not jump from the machine.

BACKHOE SAFETY CHECKLIST

Site/Location: _____ Date: _____

Backhoe Characteristics:

- ☐ Labeled for operating rated capacity.
- ☐ Steps and grab handles.
- ☐ Seat belts / ROPS.
- ☐ Protective shields or guards.
- ☐ Correct bucket size.
- ☐ Proper lighting and signals.
- ☐ Operating handles easy to reach for operator with full view of work area from all positions.
- ☐ Brake system.
- ☐ Appropriate type of fire extinguisher readily available.

Backhoe Operators:

- ☐ Trained and designated to use the equipment.
- ☐ Never exceed the equipment's rated capacity.
- ☐ Use warning signal to alert others in the work area to problems.
- ☐ Allow proper clearance, including overhead.
- ☐ Select correct size of bucket.
- ☐ Ensure area to be dug has been marked. Observe the area and contact the utilities company(s) for locations of utilities. Request "blue stake" service in advance of operations.
- ☐ Tighten sling without hands or fingers between sling and load.
- ☐ Know maximum depth capability.
- ☐ Ensure stop locks or barricades are placed near the excavation.
- ☐ Balance loads placed in buckets.

- ☐ Wear correct personal protective equipment while operating backhoe.
- ☐ Remove and secure loose clothing, tools, equipment, etc., out of operating area in cab.
- ☐ Never operate boom or bucket in an unsafe manner.
- ☐ Use equipment smoothly, avoiding sudden starts and stops.

Bucket Characteristics:

- ☐ Select by rated capacity and job requirements for model being operated.

Backhoe Inspection:

Operators are to check, observe, correct, and ensure the following at a minimum:

- ☐ Observe warnings, cautions, precautions, and recommendations in the operators manual.
- ☐ Operating mechanism: check all controls and throttle.
- ☐ Hydraulic system: Check hoses, lines, and connections or fittings
- ☐ Proper fluid levels: Check all fluid levels, use only approved fluid replacements.
- ☐ Hoses and lines: Check for cuts, excessive wear, or leaks.
- ☐ Air filter system: Check for cleanliness and in place.
- ☐ Frame-lock lever: Check lever and lock stop for damage.
- ☐ Lighting and mirrors: Check for serviceability.
- ☐ Frame, steps, and grab handles: Check for damage.
- ☐ Brakes: Check for stopping ability on and off road.
- ☐ Backup warning alarm: Check for serviceability.
- ☐ Seatbelts/ROPS: Check for cuts or missing/inoperable componets.
- ☐ Exhaust system: Check for leaks or missing componets.
- ☐ Check for fluid leaks: Check for any fluid leaks, use spill control methods until repaired.
- ☐ Tires: Check for proper inflation, tread wear and damage to rims.

☐ Grease fittings: Check fittings and grease every 8 hours of use, ensure correct type and amount is utilized.

☐ Inspect work area: Check for stop blocks or barricades, collapsed walls, unauthorized personnel in area, obstacles, or other hazardous or dangerous conditions/situations.

☐ Conduct repair/maintenance outside of populated work area. Turn equipment off, lower buckets, display warning signs.

Completed By:

_____	_____
Name	Position

TRENCHING AND EXCAVATIONS CHECKLIST

Site/Location: _____ Date: _____

Securing the Worksite:	**Yes**	**No**
Have underground utilities installations been located and protected, supported, or removed before opening the excavation?	☐	☐
Has a proper protective system been designed for the excavation site?	☐	☐
Is a written form of the design present on the site and a copy available for OSHA inspection?	☐	☐
Have structural ramps for employees and for equipment been designed to standard?	☐	☐
Have walkways been provided where necessary?	☐	☐
Are means of egress located at required 25-foot intervals in trenches four feet or more in depth?	☐	☐
Have all surface obstacles threatening worker safety been removed or supported?	☐	☐
Is the stability of adjacent structures assured by support systems?	☐	☐
Are all walkways, or bridges protected with standard guardrails and barriers?Are covers provided for remote or temporary excavations, shafts, wells, or pits?	☐	☐
Inspection:		
Before work begins, are inspections conducted daily by a competent person for:		
Risk of cave-ins?	☐	☐
Failure of protective systems?	☐	☐
Hazardous atmospheres?	☐	☐
Water accumulation?	☐	☐
Other hazards?	☐	☐
Are such inspections made after every rainstorm or other hazard-increasing occurrence?	☐	☐

Work Practices:

Have workers exposed to vehicular traffic been provided with warning vests?	☐	☐
Is there a warning system to protect mobile equipment from falling over the edge of an excavation when the operator's view is obstructed?	☐	☐
Do workers keep a safe distance from lifting or digging equipment?	☐	☐
Is emergency rescue equipment such as breathing apparatus, safety harness and line, or a basket stretcher readily available and employees trained in their use?	☐	☐
Are employees protected from loose rock or soil?	☐	☐
Is excavated or other material stored and retained at least two feet from the edge of any excavation that workers may need to enter?	☐	☐
Are installations and removals of support systems carried out in the manner and sequence required?	☐	☐

Completed By:

_____ _____

Name Position

Chapter 7

STANDARD OPERATING PROCEDURE – OPS-07
EXPLOSIVES STORAGE AND ACCOUNTABILITY

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the acquisition, storage, and accountability of explosives and unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

The following USA Environmental, Inc. (USAE) policies are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with the Work Plan, Site Safety and Health Plan, applicable Federal, State, and local regulations, and contract restrictions and guidance.

2.0 SCOPE

This SOP applies to all site personnel, including contractor and subcontractor personnel, involved in the conduct of operations on a site with UXO/MEC contamination. This SOP is not intended to contain all of the requirements needed to ensure compliance. Consult the documents listed in Section 8.0 of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES

3.1 PROJECT MANAGER

The Project Manager (PM), in conjunction with the Senior UXO Supervisor (SUXOS), is responsible for the initial quantity and type of demolition material ordered. The initial requisition should be of sufficient quantity to support the project for a 90-day period. In the event that the project is scheduled to run for less than 90 days, only one requisition will be made, if possible.

3.2 SENIOR UXO SUPERVISOR

The SUXOS will be responsible for all subsequent requisitions for demolition materials. He will accomplish this by submitting a purchase order (PO) request through the PM, who approves it and forwards it to accounting for the preparation of a PO. Accounting then forwards the PO to the Program Administrator for action.

4.0 REQUISITION PROCEDURES

The requisition of explosives will be in accordance with USAE's policy, which requires that three quotes be obtained to ensure the best possible price for the task. Of paramount importance in this process is the determination of the location of the supplier(s). Generally, response time to requisitions is better for those suppliers closest to the site. Additionally, there is the possibility of leasing explosives magazines from the supplier.

5.0 LICENSES/PERMITS

5.1 FEDERAL LICENSE

In order to requisition explosives, USAE will have a valid Bureau of Alcohol, Tobacco, and Firearms (BATF) license/permit on hand, to include an Explosives Purchase/Receipt Authorization List (See Figure-1) for the receipt of explosives. These two documents must be on file at the USAE Corporate Office, the project site, and each explosives supplier must also have a copy of each in order to sell to USAE.

5.2 STATE BLASTER'S LICENSE

If required by the state in which a project is being conducted, USAE personnel will obtain a state blaster's license. This will usually be accomplished by contacting the State Fire Marshall or Safety Office to determine the requirements and schedule for the test. Only those individuals licensed by the State may actually shoot the shot. The PM and SUXOS will be responsible for identifying the need to obtain a blaster's license for a given project and for scheduling the personnel resources needed to obtain the requisite license.

5.3 STATE/COUNTY PERMITS

In some instances, it is necessary to obtain a state or county permit to conduct open burn/open detonation. This is accomplished by contacting the State Fire Marshall or County Fire Department for instructions.

6.0 EXPLOSIVES RECEIPT

Only those individuals named on the authorization list may sign for explosives from the shipper. In order to ensure that the quantity shipped is the same as the quantity listed on the shipping documents, two USAE personnel will inventory the shipment prior to signing for it.

6.1 SHIPPING DOCUMENTS

Explosive shipments generally are accompanied by the explosive suppliers Bill of Lading (B/L) and the freight companies shipping document. The initial inventory will include reconciling the two documents with the actual shipment and creating an on-site record that includes these documents and the inventory records. Regardless of the outcome of the initial inventory, one copy of the B/L and the freight company's shipping document will be attached to a copy of the PO request and the PO. One copy of each of the four documents will be kept on file on site, and one complete set will be forwarded to the Corporate Office.

6.2 RECEIPT DISCREPANCIES

In the event that there is a discrepancy between the amount shipped and the amount received, the SUXOS will immediately contact the explosive supplier and inform the supplier of the discrepancy. It is then the responsibility of the supplier and shipper to rectify the situation and inform USAE of the results. The supplier and/or shipper must then correct their documents and forward the corrected documents to the site. In all cases, only the amount received will be entered on the Explosives Accountability Record/Magazine Data Card.

7.0 STORAGE AND ACCOUNTABILITY

Demolition operations require the availability and storage of explosive materials. To the maximum extent possible, local government facilities will be used.

7.1 STORAGE

Demolition operations require the availability and storage of explosive demolition materials. To the maximum extent possible, local government or existing facilities will be used. Existing facilities are desirable due to their low cost and pre-approval, negating transport and set up. USAE will comply with local storage criteria and procedures when using Government facilities. When required to provide explosive storage USAE will:

- Use portable approved BATF Type 2 structures or existing government furnished magazines.

- Locate, install, and maintain the magazines to comply with the magazine criteria and quantity distance requirements established in DOD 6055.9-STD, DoD Ammunition and Explosives Safety Standards.
- Install sufficient magazines to comply with explosive compatibility requirements, (i.e., bulk explosives, initiating explosives, and MEC.
- Establish security, such as fencing and/or guards, to prevent unauthorized access and/or theft.

7.1.1 TYPE 2 OUTDOOR MAGAZINES

A Type 2 magazine is a box, trailer, semi-trailer, or other mobile facility.

7.1.1.1 General

Outdoor magazines will be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and ventilated. They will be supported to prevent direct contact with the ground and, if less than 1 cubic yard in size, will be securely fastened to a fixed object. The ground around outdoor magazines must slope away for drainage or other adequate drainage provided. When unattended, vehicular magazines must have wheels removed or otherwise effectively immobilized by kingpin locking devices or other methods.

7.1.1.2 Exterior Construction

The exterior and doors are to be of not less than ¼-inch steel and lined with at least 2 inches of hardwood. Magazines with top openings will have lids with water-resistant seals or which overlap the sides by at least one inch when in a closed position.

7.1.1.3 Hinges and Hasps

Hinges and hasps will be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps will be installed so they cannot be removed when the doors are closed and locked.

7.1.1.4 Locks

Each door will be equipped with two padlocks fastened in separate hasps and staples. Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks will be protected with not less than ¼-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

7.1.2 SIGNS AND PLACARDS

The BATF and the DoD require that all magazines be appropriately posted to indicate the hazard class of the contents, the fire fighting hazards, and the emergency notification list. Magazines will be placarded in accordance with DOD 6055.9-STD. This will require that the magazine area be posted for the most hazardous items stored in the magazine area. For example, a Fire Division Class 1 is needed for recovered UXO, and a Fire Division Class 3 for the demolition material, excluding detonators, which are Fire Division Class 4. In the event that there are two fire division or hazard class items in the same magazine, use the higher hazard division/class placard.

7.1.3 LIGHTNING PROTECTION

For Base Realignment and Closure (BRAC) and active military facilities, appropriate lightning protection will be installed in accordance with Chapter 7 of DOD 6055.9 and/or the National Fire Protection Association (NFPA) requirements. For Formerly Used Defense Sites (FUDS) and other sites where existing storage facilities are typically not available, lightning protection is not required if the following criteria are met:

- The magazine is constructed of metal that is 3/16-inch steel or larger (reference Appendix L of NFPA 780).
- The magazine is grounded in accordance with NFPA requirements.
- All parts of the magazine are located at least 6.5 feet from the nearest fence.

7.1.4 EMERGENCY NOTIFICATION LIST

An emergency notification list containing the names, telephone numbers, and local addresses of the individuals to be notified in the event of an emergency, will be posted on the outside and inside of the magazine door. These individuals should be the same individuals authorized to sign for explosives.

7.1.5 COMPATIBILITY

Explosive compatibility will be maintained. Table 1 lists the various storage compatibility groups and Table 2 is the compatibility chart. In certain instances, it may be necessary to store incompatible items in the same magazine. If this should occur, a barricade, such as sandbags, within the magazine will physically separate the incompatible items. This situation should be an interim occurrence to be avoided and, if needed, approved by the client prior to implementation.

7.1.6 KEY CONTROL

Magazines will remain locked except when receipts and issues are being made. The two locks on the magazines will require two different keys to unlock. One key will be kept by the SUXOS and the second key by the Ordnance Accountability Officer (OAO). This procedure ensures that access to the magazines cannot be made without obtaining the two keys and no one individual can gain access to the magazines.

7.2 ACCOUNTABILITY

USAE will employ the following procedures to account for explosive materials:

- Control of and access to explosive magazines will be strictly controlled by the project manager. All issues and turn-ins of explosives will be properly documented and verified, though physical count, by a UXO Quality Control Specialist (UXOQCS).
- On receipt, the type, quantity, and lot number of each explosive item is recorded in the magazine data card and the original receipt documents will be maintained on file by the Site Manager.
- All requests for explosives, from the individual operating sites, will be reviewed by the Senior UXO Supervisor. Only sufficient explosives for the day's operations are issued.
- Issues of explosives are recorded on explosive usage records (Figure 2) and deducted from the magazine data card(s) (Figure 1). This procedure will ensure that the quantities of explosives on-the-floor in the magazine reflect the quantities listed on the magazine data card, and that issued explosives are accounted for while they are in the possession of individual users.
- Entries made on the explosive usage records and magazine data cards will be verified through physical count by the UXO Team Leader drawing or turning-in the explosives and the UXOQCS.
- All unused explosives are turned-in at the end of each day, re-entered on the magazine data card and recorded on the explosive usage record.
- At the end of each day the SUXOS and the UXO Team Leader reconcile the entries on each explosive usage record, and will turn these records over to the project manager.

- Weekly, the Site Manager will direct that the UXOQCS perform a 100 percent inventory of all explosives on hand. These inspections will include a physical count of the explosives and a comparison of this amount with the amount listed on the individual magazine data cards. Discrepancies and the results of these inventories will be recorded and reported to the Site Manager.

7.2.1 USAGE INVENTORY

Following each occurrence of a receipt or issue of explosive material, the OAO will conduct a joint inventory in conjunction with the demo team leader, drawing out or returning the explosives. Only those items issued/returned will be inventoried. The OAO will appropriately annotate the two sets of magazine data cards and the explosive usage record (Figure 2).

7.2.2 WEEKLY INVENTORY

The last day of each work week, the SUXOS, the OAO and a third individual (who will be changed each week) will conduct an inventory and record results on the two sets of magazine data cards.

7.2.3 DISCREPANCIES

In the event that there is a discrepancy during any inventory, the item will be recounted a minimum of two additional times. If a discrepancy still exists, the PM, the USACE Contracting Officer (or the Contracting Officer Representative) and the BATF will be notified. All actions from this point will be dictated by the BATF.

7.3 SUMMARY

The procedures contained in this SOP ensure that explosive materials are properly stored, accounted for, and issued. These procedures will be strictly followed and violations of these policies may result in an employee's immediate dismissal.

8.0 REFERENCES

Procedures and information contained in this document were obtained from the below listed references:

- EP 385-1-95a Basic Safety Concepts and Considerations for Ordnance and Explosives Operations
- USAE Safety and Health Program (SHP)
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards
- OSHA, 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- BATF P 5400.7, BATF-Explosives Law and Regulations
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives

- DOD 6055.9-STD, Department of Defense (DoD) Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement
- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 385-40 w/USACE supplement, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications

Table 1: Storage Compatibility Groups For Explosives And Ammunition	
GROUP A	
Cyclonite (RDX), dry	Mercury fulminate, wet
HMX, dry	PETN, dry
Lead azide, wet	RDX (cyclonite), dry
Lead styphnate, wet	Tetracene, wet
GROUP B	
Fuses (except chemically-actuated fuses containing ampules which may initiate, directly or indirectly, explosives and explosives-loaded components which are assembled in the conventional manner to form the finished explosive fuse).	Detonators
	Mines, practice, AP, M17
	Percussion elements
	Primer detonators
GROUP C	
Ammunition, blank and saluting, cannon	Cartridge, 90mm, canister, AP
Ammunition, .50 caliber, except API/incendiary	Cartridges, practice, over 40mm
Ammunition, 20mm, practice and high pressure test	Catapults, aircraft ejection seat, M3A1, M4A1, M5
Ammunition, 25mm, with inert projectile	Charge, propelling, not assembled to projectiles EC powder
Ammunition, 27mm, caseless	Detonating cord (primacord)
Ammunition, 30mm, ball and high pressure test	Nitrocellulose
Ammunition, 30mm, practice and training	Fuel (solid), emergency power unit
Ammunition, 37mm and 40mm, TP and AP	Propellant
Ammunition, 40mm, practice, M407A1, M382, and M385	Rockets, practice, 3.5-inch
Benite	Rocket motors, M3, M5, M6, M10, M13, M26, M30, M37, M42, M53, M66; Pershing 1st and 2nd stages; Spartan 1st, 2nd, and 3rd stages
Baron potassium nitrate	
GROUP D	
Adapter booster	Explosive D
Ammonium nitrate, except in original shipping container or equivalent	Explosives, cratering

Table 1: Storage Compatibility Groups For Explosives And Ammunition	
Ammonium perchlorate, except when particle size is over 15 microns and in original shipping container or equivalent	Grenades, rifle, AT (except pentolite loaded)
Ammonium picrate (Explosive D)	HMX, wet
Bangalore torpedoes	Mine, APERS, MN, M14 (w/integral fuse)
Baratol	Mines, antipersonnel (bounding type
Black powder, bulk	Mines, antipersonnel (cast iron block)
Bombs, demolition	Mines, HEAT Nitrocellulose wet 8-30% water exposed to detonation hazards at less than intra line distance
Bombs, fragmentation	Nitroguanidine
Bombs, general purpose	Nitrostarch Octol
Boosters	PBX
Boosters, auxiliary	pentolite
Bursters	PETN, wet
Charge, demolition, snake	Picratol
Charge, springing earth rod, blast driven	Picric acid
Charge, supplementary, HE	Projectiles, HE, fuzed or unfuzed
Compositions A, A-2, A-3, A-4, B, B-3, C, C-2, C-3, and C-4	RDX (Cyclonite), wet
Cutter, cable M1	Rocket heads, HE and HEAT (except pentolite loaded) w/o motors
Cyclonite (RDX), wet	Shaped charges
Cyclotol	Tetranitrocarbazole (TNC)
Demolition Blocks	Tetryl
Destructor, HE, M10	Tetrytol
Detonating cord (primacord) exposed to detonation hazard at less than intra line distance	TNT
Dynamite	Tritonal
Ednatol	Torpex
GROUP E	
Ammunition, HEP	Ammunition, fixed and semi-fixed, 90mm through

Table 1: Storage Compatibility Groups For Explosives And Ammunition	
	106mm, loaded with ammonal, amatol, Explosive D, composition B or TNT
Ammunition, 20mm, HE, HEI and functional packs containing HE and HEI	Cartridge, heavy mortar, over 81mm (including 81mm M56), except chemical loaded
Ammunition, 30mm, HEDP	Cartridge, light mortar, 81mm or less (excluding 81mm M56), except chemical loaded
Ammunition, 37mm, HE	Redeye guided missiles, packaged 3 complete rounds w/launcher
Ammunition, 40mm, HE, RDX loaded	
Ammunition, 40mm, HE, M406, M386, M441, and M463	Rockets, HEAT, 3.5-inch, complete round
Ammunition, 57mm through 81mm, except White Phosphorous smoke, HEP and blank	Rockets, HE, 2.75-inch (in LAU-3/A rocket launcher)
GROUP F	
Grenades, hand offensive	Grenades, fragmentation
GROUP G	
Ammunition, .50 caliber API and incendiary	Grenades, hand, CN1, ABC, M25A1, w/fuse C12
Ammunition, 20mm, API	Grenades, hand, CM1, ABC, M25A2, w/fuse C12
Ammunition, 20mm, incendiary and functional packs containing incendiary, except those containing HE or HEI	Grenades, illuminating and incendiary
Ammunition, 40mm, riot control and pyrotechnic loaded, except White Phosphorous smoke	Grenades, practice, w/spotting charge
Bombs, photoflash	Grenades, rifle, smoke, XM48E1 and M22 and M23
Cartridge, igniter, M2	Grenades, smoke (except White Phosphorous and PWP)
Cartridge, illuminating	Grenades, riot control, CS1, M25A2
Cartridge, photoflash	Igniter, spotting charge
Cartridge cases, primer (w/o propellant)	Igniters for rocket motors (e.g., M12, M18, M20 and M29)
Charge, igniter assembly, for practice hand grenades	Ignition cartridge for trench mortar ammunition
Charge, spotting, APR practice, M8	Illuminating compositions (consolidated in final press operations)
Chemical ammunition, Group B, tear or smoke	Mines, practice, w/spotting charge and/or fuse

Table 1: Storage Compatibility Groups For Explosives And Ammunition	
producing, w/explosive components, over 40mm	
Chemical ammunition, Group B, tear or smoke producing, w/o explosive components	Nuclear fire marker device 11-F2
Chemical ammunition, Group D, containing flammable solids, except for TEA or TPA, w/o explosive components	Photoflash powder
Chemical ammunition, Group D, fixed or semi-fixed rounds, containing flammable solids, except for TEA or TPA	Primers, artillery and cannon, percussion and electric
Clusters, incendiary bomb, M31 and M32 (w/o fuzing components)	Projectiles, illuminating
Destroyer, file, M4	Rocket, riot control agent, CS, 2.75-inch FFAR, MX99
Detonation, simulator, explosive M80	Simulators, M110, M115, M116, M117, M118, M119 and XM142
Grenade, hand, smoke, HC, M8	Smoke pots
Grenades, hand, CN, M7A1, w/fuse M201A1	Spotting charges (cartridge for miniature practice bombs)
Grenades, hand, CS, M7A3, w/fuse M210A1	
GROUP H	
Chemical ammunition, Group C	Grenade rifle, White Phosphorous, M19
Grenades, White Phosphorous	
GROUP J	
Chemical ammunition, Group D, containing flammable liquids or gels, with or w/o explosive components	Chemical ammunition, Group D, fixed and semi-fixed rounds, containing flammable liquids or gels with or without explosive components
GROUP K	
Chemical ammunition, Group A, with or without explosive components	Chemical ammunition, Group B, with or without explosive components, designed for toxic or incapacitating effects greater than lachrymation
Rockets, toxic chemical agents, complete rounds	
GROUP L	
Aluminum powder	Fuzes, chemically-actuated, containing ampoules which may initiate directly or indirectly, explosives and explosives loaded components which are assembled in the conventional manner to form the finished explosive fuse

Table 1: Storage Compatibility Groups For Explosives And Ammunition	
Ammonium nitrate	Magnesium powder
Ammonium perchlorate	Grenades, rifle, AT (pentolite loaded)
Ammunition, pentolite loaded	Nitrates (inorganic), except ammonium nitrate (in original shipping container or equivalent)
Chemical Ammunition, Group A, without explosive components	Perchlorates
Chemical ammunition, Group B, without explosive components, designed for toxic or incapacitating effects more severe than lachrymation	Peroxides, solid
Chemical ammunition, Group D, TEA or TPA components	Rocket heads, pentolite loaded, w/o motors
Chlorates	Zirconium (types I and II, spec. FED 1665)
DNT	
GROUP S	
Ammunition, 40mm, canister and multiple projectile	Fuse lighters
Ammunition, small arms, less than .50 caliber	Fuse safety
Explosive bellows	Squibs commercial
Firing devices	

Table 2: Storage Compatibility Chart

GROUPS	A	B	C	D	E	F	G	H	J	K	L	S
A	X	Z										Z
B	Z	X										X
C			X	Z	Z		Z					X
D			Z	X	X							X
E			Z	X	X							X
F						X						X
G			Z				X					X
H								X				X
J									X			X
K										X	U	
L										U		
S	Z	X	X	X	X	X	X	X	X			X

Notes:

1. The marking AX@ at an intersection of the above chart indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted per Note 2 below.
2. The marking AZ@ at an intersection of the above chart indicates that, when warranted by operational considerations or magazine non-availability, and when safety is not sacrificed, these groups may be combined in storage.
3. Equal numbers of separately packaged components of complete rounds of any single type of ammunition may be stored together. When so stored, compatibility is that of the assembled rounds; i.e., White Phosphorous Filler in Group H, HE Filler in Groups D, E, or F, as appropriate.
4. Group K required not only separate storage from other groups, but also requires that munitions having different toxic chemical agent fillers be stored separately from each other.
5. The marking AU@ on above chart indicates that leaking toxic chemical munitions of one agent type, i.e., GB, with or without explosive components, may be stored together in one magazine specifically designated for storage of leakers of that agent type.
6. Ammunition designated APRACTICE@ by NSN and nomenclature may be stored with the fully loaded ammunition it simulates.

Magazine Data Card

Nomenclature:

Lot Number: Unit Of Issue:

Date	Name	Received	Issued	Balance	Checkers Initials

Figure 1: Magazine Data Card

Explosives Usage Record

Contract Number:

Team Number: Date: Project Name:

Team Leader: Work Areas & Grid Numbers:

Explosives Issued — Signature Of Team Leader:

Item	Quantity	Lot Number	Checkers Initials

Explosives Expended — Signature Of Team Leader

Item	Quantity	Lot Number	Checkers Initials

Explosives Returned — Signature Of QC Officer:

Item	Quantity	Lot Number	Checkers Initials

The signatures in each section of this document indicate that the items listed in that section were in fact issued, expended, or returned to storage and that the quantities listed were verified through a physical count.

Figure 2: Explosive Usage Record

Chapter 8

STANDARD OPERATING PROCEDURE
FIRE PREVENTION AND PROTECTION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the conduct of operations involving fire prevention.

2.0 SCOPE

This SOP applies to all site operations requiring fire prevention and protection. This SOP is not intended to contain all requirements needed to ensure regulatory compliance. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with this SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

- OSHA Construction Industry Standard 29 CFR, Part 1926, Subpart F, Applicable parts
- OSHA General Industry Standard 29 CFR, Part 1910, Subpart L, Applicable parts
- USACE Engineer Manual 385-1-1, Section 9
- National Fire Protection Agency (NFPA) 30, Flammable and Combustible Liquids Code Current Edition

4.0 RESPONSIBILITIES
4.1 OCCUPATIONAL SAFETY MANAGER

The Occupational Safety Manager (OSM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR (SUXOS)

The Senior UXO Supervisor (SUXOS) will ensure that this SOP is trained and implemented for operations where fire protection and prevention is needed. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operational Log.

4.3 UXO SUPERVISOR (UXOT III)

The UXO Supervisor (UXOT III) shall be responsible for the field implementation of this SOP, and for implementing the safety and health requirements outlined in Section 5.0 of this SOP. In the absence of a SUXOS, the UXOT III shall be responsible for implementing the SUXOS's responsibilities, outlined in Paragraph 4.2.

4.4 UXO SAFETY OFFICER/SITE SAFETY AND HEALTH OFFICER (UXOSO/SSHO)

The UXOSO/SSHO will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the daily tailgate safety briefings. The UXOSO/SSHO will also be responsible for daily inspection of site operations and conditions to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

5.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in operations shall be familiar with the potential safety and health hazards associated with the conduct of this SOP, and with the work practices and control techniques to be used to reduce or eliminate these hazards.

5.1 CAUSES OF FIRES AND EXPLOSIONS

Although fires and explosions may arise spontaneously, they are more commonly the result of carelessness during the conduct of site activities, such as moving drums, mixing/bulking of site chemicals, and during refueling of heavy or hand held equipment. Some potential causes of explosions and fires include:

- Mixing incompatible chemicals which cause reactions that spontaneously ignite due to the production of both flammable vapors and heat;
- Ignition of explosive or flammable chemical gases or vapors by external ignition sources;
- Ignition of materials due to oxygen enrichment;
- Agitation of shock- or friction-sensitive compounds;
- Welding and cutting operations;
- Hot surfaces and frictional heat sources;
- Sparks, whether from static, electrical, or mechanical sources; and
- Careless handling of matches, cigarettes, and other lighted materials.

5.2 FIRE PREVENTION

Explosions and fires not only pose the obvious hazards of intense heat, open flames, smoke inhalation, and flying objects, but may also cause the release of toxic chemicals into the environment. Such releases can threaten both personnel on site and members of the general public. Site personnel conducting operations involving flammable or combustible material shall follow the guidelines listed below to aid in the prevention of fires and explosions.

5.2.1 IGNITION SOURCES

All sources of ignition will be prohibited within 50 feet of a potential fire or explosion hazard. Ignition sources which may be of concern are: smoking; small engines and their exhausts; heavy equipment engines and their exhaust; non-intrinsically safe electrical hand tools, lights, equipment, etc.; steel hand tools capable of creating sparks; open flames; non-intrinsically safe monitoring instruments; and room/area heating devices.

5.2.2 SITE INSPECTIONS

To ensure adequate fire protection, the UXOSO/SSHO will inspect the site daily to ensure that all

flammable and combustible materials are being safely stored in appropriate containers in properly configured and segregated storage areas. The UXOSO/SSHO will also ensure that sources of ignition are removed to a safe distance from storage areas.

5.2.3 STORAGE OF FLAMMABLE AND COMBUSTIBLE MATERIALS

5.2.3.1 Approved Containers

Quantities of flammable liquids greater than one gallon shall be stored or handled in OSHA approved safety cans only. These cans have a built-in flame arrestor, and a tight-fitting self-closing lid to reduce the possibility of vapors escaping from the can. For quantities of flammable liquids of one gallon or less, the original container, or an OSHA-approved safety can, shall be used for handling or storage. There will be no glass containers.

5.2.3.2 General Storage Requirements

Site personnel shall utilize the guidelines and procedures listed in this paragraph when storing flammable and combustible materials on site.

- Flammable materials shall be stored in a segregated area located away from spark or ignition sources, with flagging, or other barrier materials, erected at a radius of fifty feet from the storage area, and "NO SMOKING, MATCHES, OR OPEN FLAME" signs posted at the fifty-foot barrier line.
- If, due to site configuration, a fifty-foot radius barrier cannot be erected around the storage area, signs stating "NO SMOKING, MATCHES, OR OPEN FLAME WITHIN 50 FEET" will be posted at the storage location.
- For storage inside a building, no more than 25 gallons of flammable materials may be stored outside of approved fire cabinet, and no more than 60 gallons of flammable or 120 gallons of combustible liquids may be stored in each cabinet.
- For storage of containers (of not more than 60 gallons each) outside, no more than 1,100 gallons shall be stored in one designated area, with at least five feet separating storage areas.
- Outdoor storage areas shall be at least 20 feet from the nearest building, and there shall be a 12-foot-wide fire truck access lane within 200 feet of the storage area.
- Storage areas outside shall be graded to allow collection of spilled material, or provided with a 12-inch curbed or earthen dike containment system of sufficient volume to contain the contents stored in the area; provisions shall be made for drainage or collection of accumulated rain water or spilled materials.
- Metal drums used for storing flammable/combustible liquids shall be equipped with self-closing safety faucets, vent bung fittings, grounding cables, and drip pans, and shall be stored outside buildings in an area approved by the UXOSO/SSHO.
- The storage area shall be kept free of weeds, debris, and other combustible materials not related to the storage.
- At least one fire extinguisher rated 20B:C units or greater shall be located between 25 and 75 feet of outdoor storage areas.

5.2.4 DISPENSING FLAMMABLE AND COMBUSTIBLE LIQUIDS

When dispensing flammable or combustible liquids from one container to another, the following

requirements shall apply:

- Areas where flammable or combustible liquids are dispensed in quantities greater than five gallons shall be separated from other operations by at least 25 feet.
- Spill containment shall be provided in the dispensing area.
- All tanks, hoses, and containers of five gallons or less shall be kept in metallic containers with a bonded contact during transfer operations.
- Transfer of flammable liquids in containers in excess of five gallons shall be done only when the two containers are electrically bonded, and the container being dispensed from shall be grounded.
- Natural or mechanical ventilation shall be provided to maintain flammable vapors below 5% of the lower explosive limit.
- Transfer of liquids by air pressure is not permitted, and either a non-sparking hand pump or gravity feed shall be used.

5.2.5 HANDLING LIQUIDS AT POINT OF FINAL USE

When using flammable or combustible liquids at the point of final use, the following requirements shall apply:

- Flammable liquids shall be kept in closed containers.
- Leakage or spillage of flammable or combustible liquids shall be collected and disposed of quickly and properly.
- No open flames or other sources of ignition will be allowed within 50 feet of operations involving flammable or combustible liquids.

5.2.6 SERVICE AND REFUELING AREAS

The following requirements shall apply to service and refueling areas:

- Only approved storage containers, trucks, and hoses shall be used.
- No smoking will be allowed within 50 feet of areas where fueling operations are being conducted, and conspicuous signs shall be posted prohibiting smoking in the areas.
- The motors of all equipment being fueled shall be shut off during fueling.
- A fire extinguisher of at least 20B:C units or greater shall be located within 75 feet of fueling operations.

5.2.7 HANDLING AND DISPENSING

Site personnel shall utilize the guidelines and procedures listed in this paragraph when dispensing flammable and combustible materials.

5.3 FIRE PROTECTION

5.3.1 GENERAL REQUIREMENTS

The general requirements listed below shall be followed to help provide effective fire protection, and shall

apply to all sites:

- All areas where potentially explosive/flammable atmospheres may accumulate shall be monitored using a combustible gas indicator.
- Prior to initiation of site activities involving explosive/flammable materials, all potential ignition sources shall be removed or extinguished.
- Non-sparking and explosion-proof equipment shall be used whenever the potential for ignition of explosive/flammable gases, vapors, and/or liquids exist.
- Dilution or induced ventilation may be used to decrease the airborne concentration of explosive/flammable atmospheres to below 5% of the lower explosive limit.

5.3.2 TRAINING

All site personnel involved in operations where flammable or combustible liquids or materials are used, or may be encountered, shall be given training as part of the initial mobilization training which covers the anticipated hazards and the relevant control techniques. This training shall include fire extinguisher training that covers the selection and use of fire extinguishers.

5.3.3 FIRE EXTINGUISHERS

Portable fire extinguishers shall be selected and conspicuously located on site IAW the type of fire or explosion hazard anticipated. To determine the size and type of extinguishers required, consult the Site Health and Safety Plan.

5.3.4 FIRES

The decision to attempt to extinguish a fire using available site personnel and equipment will be made by the UXOSO/SSHO, and based on whether the fire is small, large, or involves explosives.

5.3.5 SMALL FIRES

A small fire is defined as a fire that can most likely be extinguished by site personnel using one or two 10-20 lb portable extinguishers. A small fire must also be free and clear of explosive materials, especially UXO/MEC. If a small fire occurs, the UXOSO/SSHO will direct site personnel to perform the following, if safe to do so:

- Evacuate unnecessary personnel to an upwind position.
- Attempt to extinguish the fire using portable fire extinguishers, or by smothering.
- Remove any essential or flammable items from the path of the fire.
- Notify emergency response services (fire, police, ambulance, hospital, etc.), as needed.

5.3.6 LARGE FIRES

A large fire is defined as a fire which cannot be extinguished or one which, due to its size, cannot be extinguished using one or two 10-20 lb. fire extinguishers. In the event that a large fire occurs and the fire does not involve explosive materials, the UXOSO/SSHO will direct personnel to conduct the following, if safe to do so:

- Evacuate all non-essential personnel from the site to an upwind location.

- Notify the fire department and other emergency response services, as needed.
- Order the appropriate level of PPE to be worn by personnel responding to the fire.
- Attempt to control the fire to the extent possible.
- Remove any essential or flammable items from the path of the fire.

5.3.7 FIRES INVOLVING EXPLOSIVE MATERIALS

If a fire occurs which involves explosive materials such as chemicals, fuels, or UXO/MEC, the UXOSO/SSHO will order the immediate evacuation of all site personnel to a predetermined upwind assembly point. The assembly point will be located at a safe distance from the site. The UXOSO/SSHO will then notify the fire department and any other emergency services (e.g., police, ambulance, hospital), as needed.

5.4 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following safety measures and personal protective equipment (PPE) shall be used in preventing or reducing exposures associated with fire prevention and protection operations. These requirements will be implemented, unless superseded by site-specific requirements stated in the Site Safety and Health Plan and approved by the Occupational Safety Manager or the Corporate Safety and Health Manager.

Personnel who may come in contact with flammable or combustible liquids shall be assigned appropriate PPE to avoid skin or eye contact with the material.

In the event of an on-site fire, the UXOSO/SSHO will assess the situation, determine the potential hazards, and, if need be, assign levels of PPE to be worn during firefighting.

Chapter 9

STANDARD OPERATING PROCEDURE
HAZARD COMMUNICATION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the conduct of operations involving the use of products containing hazardous substances.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel, and operations involved in the use of products containing hazardous substances. This SOP is not intended to contain all requirements needed to ensure regulatory compliance. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with this SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

- OSHA Construction Industry Standard 29 CFR, Part 1926.59
- OSHA General Industry Standard 29 CFR, Part 1910.1200
- USACE Engineer Manual 385-1-1, Sections 6.A and 6.B

4.0 RESPONSIBILITIES

4.1 OCCUPATIONAL SAFETY MANAGER

The Occupational Safety Manager (OSM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is implemented in all operations involving the use of products containing hazardous substances. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operational Log.

4.3 UXO TECHNICIAN III

The UXO Technician III (UXOTIII) shall be responsible for the field implementation of this SOP, and for implementing the safety and health requirements outlined in Section 5.0 of this SOP. In the absence of a SUXOS, the UXOTIII shall be responsible for implementing the SUXOS's responsibilities, outlined in Paragraph 4.2.

4.4 UXO SAFETY OFFICER/SITE SAFETY AND HEALTH OFFICER

The UXO Safety Officer (UXOSO)/Site Safety and Health Officer (SSHO) will be responsible for ensuring

that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the daily tailgate safety briefings. The UXOSO/SSHO will also be responsible for daily inspection of site operations and conditions to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

5.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, in operations involving hazardous substances shall be familiar with the potential safety and health hazards associated with the conduct of those operations, and with the work practices and control techniques to be used in order to reduce or eliminate these hazards.

5.1 MATERIAL SAFETY DATA SHEETS

5.1.1 MSDS AVAILABILITY

A material safety data sheet (MSDS) for each product containing a hazardous chemical to which employees are or may be exposed, will be obtained and made readily available to all site employees. MSDSs will be located at each project site. The UXOSO/SSHO will be responsible for obtaining and maintaining MSDSs. The UXOSO/SSHO will also be responsible for reviewing MSDSs for significant safety and health information, which will then be passed on to the affected employees during formal training sessions. MSDSs will also be reviewed by the UXOSO/SSHO for completeness. If an MSDS is missing or considered to be incomplete/insufficient, a new MSDS will be requested from the manufacturer. A copy of all MSDSs obtained for the site will be sent to the Occupational Safety Manager (OSM) or the Corporate Safety and Health Manager (CSHM) for further review, and will be included in the corporate MSDS file.

MSDSs will be available for all employees in their work area for review. If MSDSs are not available, or a new chemical being used on site does not have a corresponding MSDS, the UXOSO/SSHO will obtain the MSDS from the manufacturer as soon as possible. An MSDS that does not specifically identify the hazardous chemicals contained in the project will be accepted if:

- Approved by the UXOSO/SSHO
- The information has been classified as a trade secret
- The MSDS contains adequate information related to the physical and health hazards associated with the product

5.2 CHEMICAL INVENTORY

A Site-Specific Chemical Inventory will be maintained by the UXOSO. This inventory will include all products containing hazardous chemicals. The Hazardous Chemical Inventory Form will be used to maintain the site-specific chemical inventory. A copy is to be sent to the OSM.

5.3 LABELING

5.3.1 CONTAINER LABELING

No container of hazardous chemicals will be released for use until the following label information is verified:

- Identification of the chemical
- Appropriate hazard warnings
- Name and address of chemical manufacturer, or distributor (applies only to manufacturer's labels)

5.3.2 SECONDARY CONTAINER LABELING

To further ensure that employees are readily provided with information concerning chemicals in their work areas, the UXOSO/SSHO will ensure that all secondary containers are properly labeled with an appropriate hazard communication label. This label must communicate the identity of the hazardous chemicals contained in the product and their appropriate physical and health hazard warnings.

5.4 EMPLOYEE INFORMATION AND TRAINING

5.4.1 GENERAL

The UXOSO/SSHO will arrange for employee information and training at the time of initial assignment (for existing hazardous chemicals), whenever a new hazardous chemical is introduced into the work area, or when an employee changes job locations where new chemicals are encountered.

5.4.2 REQUIRED INFORMATION

Employees will be trained to recall, in simple language, the following basic information about each hazardous chemical:

- The basic requirements of the OSHA Hazard Communication (HAZCOM) Standard, including employee rights under the regulation
- Operations/processes where the potential exists for exposure to hazardous chemicals
- Location of the written HAZCOM Program, the Chemical Inventory, and the MSDSs
- How chemicals may be detected/monitored (instrumentation, color, odor, state)
- Physical hazards (i.e., flammability, reactivity)
- Chemical hazards, including the effects a chemical has on the body (long- and short-term) through inhalation, ingestion, or skin contact
- How workers can protect themselves from overexposure or emergency situations (engineering controls, work practices, personal protective equipment (PPE), and emergency procedures)
- Steps that have been taken to lessen or prevent exposure to hazardous chemicals through implementation of the HAZCOM
- Spill response procedures for chemical emergencies
- Emergency and first aid procedures to follow in case of employee overexposure to any hazardous chemicals
- How to read labels and review MSDSs to obtain appropriate hazard information

5.4.3 DOCUMENTATION OF TRAINING

Hazard Communication Training will be documented by the UXOSO/SSHO using the Employee Hazard Communication and Training Checklist.

5.5 HAZARDS FROM NON-ROUTINE TASKS

Periodically, employees are required to perform potentially hazardous, non-routine tasks which may involve chemical or physical hazards. Prior to starting work on such tasks, the UXOSO/SSHO will give the affected employees information about the hazards to which they may be exposed. This training will be documented in the Site Training Log, and will include:

- Specific hazards (chemical and physical)
- Protective safety measures to be utilized
- Measures that have been, or will be, taken to lessen the hazards, including ventilation,

respirators, PPE, a standby person, and emergency procedures

5.6 INFORMING CLIENTS/SUBCONTRACTORS

Each client/subcontractor will be instructed to inform the UXOSO/SSHO of any hazardous chemicals which they bring on site, and will provide a copy of the MSDS for each specific chemical(s). The UXOSO/SSHO will ensure that outside clients/subcontractors are provided with the following information to allow them to work safely on site:

- Hazardous chemicals to which they may be exposed while on the job site
- Precautions and protective measures to be taken by employees to avoid possible exposure
- The rules and regulations regarding fire and ignition sources around flammable materials, and rules regarding smoking, welding, grinding, and other similar activities.

5.7 INDUSTRIAL HYGIENE SURVEY

Periodic surveys will be performed to evaluate the potential for employee exposure to chemicals on project sites. These surveys will be used to assess exposure levels and the effectiveness of engineering, work practices, and personal protective equipment controls. These efforts will be coordinated by the UXOSO/SSHO and the SUXOS, and will include:

- A walk-through evaluation of potential chemical exposures utilizing the chemical inventory, MSDSs, and, when required, air sampling equipment
- A review of occupational illness records, for trends of hazard exposure
- A review of engineering controls and personal protective measures
- Recommendations for future control methods

Where a question exists concerning employee exposure to hazardous chemicals, engineering controls, or PPE requirements, the Certified Safety Professional will be contacted immediately.

5.8 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following operational precautions and personal protective equipment shall be used in preventing or reducing exposures associated with operations involving the use of products containing hazardous substances:

- Operations where hazardous substances are used will be conducted in well-ventilated areas; and where needed and available, direct-reading instruments will be used to assess personnel exposure.
- All personnel will wear chemical-protective gloves, clothing, or other PPE, as specified by the MSDS, Site Health and Safety Plan, or sampling.

Chapter 10

STANDARD OPERATING PROCEDURE
HEARING CONSERVATION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the conduct of operations by USA Environmental, Inc. (USA) involving the personnel exposure or potential exposure to high noise levels.

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, and operations involving noise exposure. This SOP is not all inclusive or intended to contain all requirements needed to ensure regulatory compliance. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with this SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

- OSHA Construction Industry Standard 29 CFR, Part 1926.59
- OSHA General Industry Standard 29 CFR, Part 1910.95
- USACE Engineer Manual 385-1-1, Section 5.C

4.0 RESPONSIBILITIES

4.1 PROJECT MANAGER

The Project Manager (PM) will be responsible for ensuring the availability of the resources needed to implement this SOP, and will also ensure that this SOP is incorporated into site-specific plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is trained and implemented in operations which involve personnel exposure to high noise sources. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operational Log.

4.3 UXO SUPERVISOR/UXO TECHNICIAN III

The UXO Supervisor/UXO Technician III (UXOTIII) will be responsible for the field implementation of this SOP, and for implementing the safety and health requirements outlined in Section 5.0 of this SOP.

4.4 UXO SAFETY OFFICER/SITE SAFETY AND HEALTH OFFICER

The UXO Safety Officer (UXOSO)/Site Safety and Health Officer (SSHO) will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the daily tailgate safety briefings. The UXOSO/SSHO will also be

responsible for daily inspection of site operations and conditions to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

5.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in high noise operations will be familiar with the potential safety and health hazards associated with the conduct of this operation, and with the work practices and control techniques to be used to reduce or eliminate these hazards.

5.1 SAFETY AND HEALTH HAZARDS

The safety and health hazards associated with the conduct of operations in high noise environments may include the following:

- Physical traumas to the middle or inner ear, resulting in conductive hearing loss, which may be permanent, heal naturally, or be repaired through surgical techniques;
- Onset of sensor neural hearing loss caused by the destruction of sound sensing nerves in the inner ear;
- Interference with voice communication and concentration;
- Interference with site personnel's ability to detect emergency alarms; and
- Increase in emotional and physiological stress.

5.2 NOISE EXPOSURE MONITORING

5.2.1 GENERAL REQUIREMENTS

Noise exposure monitoring will be conducted to evaluate the potential for employee exposure to noise levels in excess of those outlined in Table 1. Employees will be given the opportunity to observe any noise measurements conducted, and will be informed if they have been exposed to noise at or above the OSHA Action Level. The purpose of workplace noise monitoring is to:

- Collect data to identify noise areas where exposures exceed the OSHA Action Level;
- Identify affected employees to be included in the Hearing Conservation Program (HCP);
- Enable proper selection of hearing protection; and
- Provide data that will assist in the designing of engineering and work practice controls.

5.2.2 NOISE MONITORING PROCEDURE

The objective of noise monitoring is to identify those operations which may cause personnel to receive an excessive exposure to noise. Typical site operations which have a real potential for causing overexposures are: drill rig operations; brush-clearing operations; using gas powered weed eaters, chain saws, or brush hogs; and soil excavation and moving operations involving backhoe, front-end loaders, and similar heavy equipment. Whenever sound level or noise dosimetry monitoring is conducted, the monitoring equipment will be used, calibrated, and maintained in accordance with the manufacturer's specifications. Sound level and noise dosimeter monitoring data will be recorded on the appropriate form.

Operations that have a potential for causing an overexposure will be identified in the SSHP. When these operations are initiated, the UXOSO/SSHO will conduct sound level monitoring (as appropriate) to

determine if noise levels in the hearing zone meet or exceed 85 dBA or 140 dBA impulse. If an operation is identified that causes exposures greater than 85 dBA, the UXOSO/SSHO will conduct noise dosimetry monitoring (as appropriate) of the personnel working in the area. Continuous noise dosimetry will be conducted for at least 85% of the work shift duration and the UXOSO/SSHO will provide a description of the noise exposure potential for any non-monitored periods during the work shift. The microphone for the noise dosimeter will be positioned in the hearing zone nearest the noise source.

5.2.3 REPEATED EXPOSURE MONITORING

Sound level and noise dosimetry monitoring will be repeated whenever a change in operations, equipment, or protective measures increases noise exposure such that additional employees may be exposed at or above the 85 dBA action level. Monitoring will also be repeated if existing noise protective measures are rendered ineffective.

5.3 OPERATIONAL CONTROL TECHNIQUES

5.3.1 ENGINEERING CONTROLS

Whenever feasible, engineering controls will be utilized to reduce personnel exposure to high noise levels. Typical engineering controls include: reduction in the speed or energy input for vibrating sources; installation of dampening devices to absorb vibration; isolation of site personnel from the noise source; or isolation of the noise source from the work area; and construction of sound-absorbing physical barriers between the noise source and the site personnel.

5.3.2 WORK PRACTICE CONTROLS

Work practice controls can also be used to reduce personnel exposures and may involve the use of the following: routine maintenance of machinery/equipment and increasing the distance between personnel and the noise source. At no time is it acceptable to use worker rotation into and out of high noise areas as a method of reducing individual exposure.

5.3.3 PERSONAL PROTECTIVE EQUIPMENT

5.3.3.1 Use of Hearing Protection Devices

Hearing protectors will be made available to all personnel working in areas where the exposures to noise are, or may be, equal to or greater than the 85 dBA action level. Hearing protectors will be required for, and will be worn by, all personnel whose noise exposure exceeds the OSHA permissible exposure limits (PELs) listed in Table 1 of this SOP. Also, any employees who have experienced a standard threshold shift, as identified by audiogram testing, must use hearing protectors when exposures are at or above the 85 dBA action level.

5.3.4 ATTENUATION OF HEARING PROTECTION DEVICES

All hearing protection devices will be evaluated by the UXOSO/SSHO for attenuation, using the noise reduction rating (NRR) which appears on equipment packaging. Attenuation of hearing protection devices will be calculated using the procedures found in Appendix B of 29 CFR 1910.95. Hearing protector attenuation will be adequate to reduce exposure to an 8-hour time-weighted average (TWA) of 90 dBA or less.

Selection of hearing protection will be based on the individual types of protection or a combination when necessary to achieve the required results. Example: foam ear inserts and over the ear "muff" type protectors.

5.4 AUDIOMETRIC TESTING

5.4.1 GENERAL REQUIREMENTS

As a Part of the USAE Hearing Conservation Program, audiometric testing will be conducted on all personnel whose job requirements expose them to an 8-hour TWA noise exposure at or in excess of the Action Level of 85 dBA. Affected employees will receive baseline and annual audiometric (when available) tests conducted IAW 29CFR 1910.95.

5.4.2 EVALUATION OF AUDIOGRAMS

Each annual audiogram will be compared to the baseline audiogram by a certified technician or physician to determine if a standard threshold shift (STS) has occurred in the speech frequencies. If an STS has occurred, the employee will be retested in thirty days to determine if the STS is permanent. If the STS is permanent and the evaluating physician determines that the STS is work-related, then the employee will be notified in 21 days and if any follow up is indicated.

5.5 EMPLOYEE TRAINING

Personnel who are exposed to noise levels at or above the 85 dBA action level will receive initial and annual training. The training will, at a minimum, include the following:

- The contents of the OSHA Occupational Noise Exposure Standard, 29 CFR 1910.95, EM385-1-1(Chapter C), and this HCP;
- The effects of noise on hearing;
- The purpose, advantages, disadvantages, and attenuation capabilities of various hearing protectors;
- Instructions on selection, fitting, use, and care of hearing protectors; and

TABLE 1: PERMISSIBLE NOISE EXPOSURE LEVELS

DURATION PER DAY (HRS):	SOUND LEVEL (dBA):
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or Less	115

6.0 ATTACHMENTS

Individual Hearing Conservation Checklist

INDIVIDUAL HEARING CONSERVATION CHECKLIST

Do's:

- ☐ Be aware of noise levels requiring hearing protection.
- ☐ Wear assigned hearing protectors.
- ☐ Report hearing protectors that don't fit well or are in poor condition.
- ☐ Make sure hands are clean before inserting or putting on hearing protectors.
- ☐ Keep hearing protectors clean.
- ☐ Use hearing protectors in loud-noise activities off the job.

DON'T:

- ☐ Tamper with hearing-testing, monitoring instruments, or noise-reduction equipment.
- ☐ Ignore or "forget" to use hearing protection.
- ☐ Use hearing protectors that are loose or cracked.
- ☐ Use hearing protectors that don't fit snugly over or into the ear.

Chapter 11

STANDARD OPERATING PROCEDURE
HEAVY EQUIPMENT OPERATION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the conduct of operations involving the use of heavy equipment.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel, and operations involved in the conduct of heavy equipment operations. This SOP is not intended to contain all requirements needed to ensure regulatory compliance. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with the SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

- Applicable parts of OSHA Construction Industry Standard 29 CFR, Part 1926, Subpart O
- Applicable parts of OSHA General Industry Standard 29 CFR, Part 191, Subpart N
- USACE Engineer Manual 385-1-1, Section 16

4.0 RESPONSIBILITIES
4.1 PROJECT MANAGER

The Project Manager (PM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is implemented for heavy equipment operations. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operational Log.

4.3 UXO TECHNICIAN III

The UXO Technician III (UXOTIII) shall be responsible for the field implementation, of this SOP and for implementing the safety and health requirements outlined in Section 5.0 of this SOP. In the absence of a SUXOS, the UXOT III shall be responsible for implementing the SUXOS's responsibilities outlined in Paragraph 4.2.

4.4 UXO SAFETY OFFICER

The UXO Safety Officer (UXOSO) will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the

daily tailgate safety briefings. The UXOSO will also be responsible for daily inspection of site operations and conditions to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

5.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in heavy equipment operations shall be familiar with the potential safety and health hazards associated with the conduct of this operation, and with the work practices and control techniques to be used to reduce or eliminate these hazards. In the event that ordnance and explosives are present at the work site, the procedures for anomaly avoidance and soil excavation will be presented in the Work Plan and Site Safety and Health Plan.

5.1 SAFETY HAZARDS AND OPERATIONAL CONTROL TECHNIQUES

The operational control techniques to be used during conduct of heavy equipment operations are discussed below:

- The operation of heavy equipment shall be limited to authorized personnel specifically trained in its operation.
- A competent person shall visually inspect heavy equipment daily prior to operation, and report any abnormalities/deficiencies to the UXOSO.
- The operator shall use the safety devices provided with the equipment, including seat belts and backup warning indicators, and horns shall be operable at all times.
- While in operation, all personnel not directly required in the area shall keep a safe distance from the equipment.
- The operator's cab shall be kept free of all non-essential items, and all loose items shall be secured.
- Personnel shall avoid moving into the path of operating equipment, and areas blinded from the operator's vision shall be avoided.
- Heavy equipment requiring an operator shall not be permitted to run unattended.
- Except for equipment designed to be serviced while in operation, all equipment shall be shut down and positive means taken to prevent its operation while repair or servicing is being conducted.
- All equipment shall be secured at the end of the day, or when not in operation, with the blades/buckets of earth-moving equipment placed on the ground.
- Equipment operated on the highway shall be equipped with turn signals visible from the front and rear.
- Stationary machinery and equipment shall be placed on a firm foundation and secured before being operated.
- All points requiring lubrication during operation shall have fittings so located or guarded as to be accessible without hazardous exposure.
- Mobile-type equipment operating within an off-highway job site not open to public traffic shall have a service brake system and a parking brake system capable of stopping and holding the equipment fully loaded on the grade of operation.
- Heavy equipment shall be shut down prior to and during fueling operations.
- All equipment with windshields shall be equipped with powered wipers and equipment that operates under conditions that cause fogging or frosting of windshields shall be equipped with operable defogging or defrosting devices.
- Whenever the equipment is parked, the parking brake shall be set, and equipment parked on inclines shall have the wheels chocked or track mechanism blocked and the parking brake set.
- Personnel shall not work or pass under the buckets or booms of loaders in operation.

- Each bulldozer, scraper, drag-line, crane, motor grader, front-end loader, mechanical shovel, back hoe, dump truck, and other similar equipment shall be equipped with at least one dry chemical fire extinguisher having a minimum UL rating of 5-B:C.
- When heavy equipment must negotiate in tight quarters, or if operators of earth-moving equipment cannot see the bucket, a secondary person shall be stationed to guide the operator.
- Additional riders shall not be allowed on equipment, unless it is specifically designed for that purpose (i.e., there is an additional seat with a seat belt).

5.2 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following safety measures and personal protective equipment shall be used in preventing or reducing exposures associated with heavy equipment operations. These requirements will be implemented, unless superseded by site-specific requirements stated in the Site Safety and Health Plan.

- Heavy equipment operators will have received training which addresses the safe operation of the equipment to be used.
- Heavy equipment operators shall wear the level of personal protective equipment as specified in the Site Safety and Health Plan.

Chapter 12

STANDARD OPERATING PROCEDURE
MATERIAL HANDLING AND LIFTING

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the conduct of operations involving material handling.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel, and operations involved in material handling. This SOP is not intended to contain all requirements needed to ensure regulatory compliance. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to the conduct of operations associated with this SOP. In the event that other hazards are associated with the conduct of this SOP, consultation of other SOPs and regulatory references may be needed:

- OSHA Construction Industry Standard 29 CFR, Part 1910, Subparts H
- OSHA General Industry Standard 29 CFR, Part 1926, Subpart H and N
- USACE Engineer Manual 385-1-1, Section 14

4.0 RESPONSIBILITIES

4.1 PROJECT MANAGER

The Project Manager (PM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is trained and implemented in operations involving material handling. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Daily Operational Log.

4.3 UXO TECNICIAN III

The UXO Technician III (UXOTIII) will be responsible for the field implementation of this SOP and for implementing the safety and health requirements outlined in Section 5.0 of this SOP. In the absence of a SUXOS, the UXOTIII shall be responsible for implementing the SUXOS's responsibilities.

4.4 UXO SAFETY OFFICER/SITE SAFETY AND HEALTH OFFICER

The UXO Safety Officer (UXOSO)/Site Safety and Health Officer (SSHO) will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the daily tailgate safety briefings. The UXOSO/SSHO will also be

responsible for daily inspection of site operations and conditions to ensure their initial and continued compliance with this SOP and other regulatory guidelines.

5.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in material handling operations, shall be familiar with the potential safety and health hazards associated with the conduct of this operation, and with the work practices and control techniques to be used to reduce or eliminate these hazards.

5.1 SAFE MATERIAL HANDLING AND LIFTING TECHNIQUES

The safety and health hazards and operational control techniques to be used during conduct of material handling operations are discussed in the subsections below.

5.1.1 ENGINEERING CONTROLS

Whenever heavy or bulky material is to be moved; the size, shape, weight, distance, and path of movement of the object must be considered, and the following hierarchy shall be followed in selecting a means for material handling:

- Elimination of material handling requirements through engineering design;
- Movement of the material by mechanical device (i.e., lift truck, crane, etc.);
- Movement by manual means using mechanical aid (i.e., dolly or cart); and
- Movement by manual means with protective equipment (i.e., lifting belt or lifting monitor).

5.1.2 SAFE WORK PRACTICES

The following fundamentals address the proper manual material lifting procedures:

- A firm grip on the object is essential; therefore, the hands and object shall be free of oil, grease, and water, which might prevent a firm grip and gloves shall be used, if necessary, to protect the hands;
- The hands, especially the fingers, shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down;
- The item shall be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points;
- The feet shall be placed far enough apart for good balance and stability;
- Personnel shall ensure that solid footing is available prior to lifting the object;
- When lifting, get as close to the load as possible, bend the legs at the knees, and keep the back as straight as possible;
- To lift the object, the legs are straightened from their bending position;
- Never carry a load that you cannot see over or around;
- When placing an object down, the stance and position are identical to that for lifting, with the back kept straight and the legs bent at the knees, the object is lowered;
- If needed, personnel shall be provided with back support devices to aid in preventing back injury during lifting activities;
- Materials will not be moved over or suspended over personnel unless positive precautions have been made to protect personnel from falling objects; and
- Where movement of materials may be hazardous to persons, taglines or other devices shall be used to control loads being handled by hoisting equipment.

5.1.3 TWO PERSON LIFTING

When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly, and that the weight is equally divided between the individuals carrying the load. When carrying the object, each person, if possible, shall face the direction in which the object is being carried.

5.2 MATERIAL STORAGE

To ensure the safety and health of site personnel, the general guidelines listed below shall be followed when materials are stored on site. For more detailed guidelines pertaining to the storage of specific items, such as lumber, bricks, pipe, reinforcing steal, etc., consult the references listed in Section 3.0 of this SOP.

- All materials shall be stored in orderly piles or stacks away from walkways and roadways, and access ways around stored material shall be kept clear;
- All materials stored in tiers, whether in bags, containers, or bundles, shall be stacked, blocked, or interlocked, and limited in height to ensure that the material is stable and to prevent sliding or collapse;
- Materials shall be stored at a height that is as low as practical and shall not be stored at a height greater than 20 feet;
- Flammable and combustible materials shall be stored in accordance with the provisions outlined in the Fire Protection and Prevention SOP;
- All personnel shall be in a safe position while materials are being loaded or unloaded from vehicles;
- Non-compatible materials shall not be stored together; and
- Reusable lumber shall have all nails withdrawn before being stored.

5.3 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following safety measures and personal protective equipment (PPE) shall be used for the prevention of accidents associated with material handling operations. These requirements will be implemented, unless superseded by site-specific requirements stated in the Site Safety and Health Plan.

- When handling materials, proper gloves will be worn to prevent puncture, laceration, or abrasion;
- Gloves will be selected according to the nature, material, and condition of the item(s) to be lifted; and
- Safety Toed boots will be worn if the carried load presents a foot hazard.

Chapter 13

STANDARD OPERATING PROCEDURE
MEC AVOIDANCE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to munitions and explosives of concern (MEC) avoidance on sites contaminated with unexploded ordnance (UXO) or MEC.

2.0 SCOPE

This SOP applies to all USA Environmental, Inc. (USAE) site personnel, including contractor and subcontractor personnel, involved in the conduct of MEC avoidance operations on a site potentially contaminated with UXO/MEC. This SOP is not intended to contain all of the requirements needed to ensure complete compliance and is not a stand-alone document. This SOP should be used together with Work Plans, other USAE SOPs, the Site Safety and Health Plan (SSHP), applicable Federal, State, local regulations, and contract restrictions and guidance. Consult the documents listed in Section 9.0 of this SOP for additional compliance issues.

3.0 MEC/UXO BASIC AND GENERAL SAFETY PRECAUTIONS

These basic safety precautions are the minimum MEC safety requirements required of all personnel on site. Other precautions and requirements are found in applicable MEC manuals.

3.1 BASIC CONSIDERATIONS

The following should be taken into consideration when planning or conducting MEC avoidance support operations:

- SAFETY IS PARAMOUNT
- Do not move or disturb unidentified items
- Do not collect souvenirs
- Do not smoke except in designated areas
- Do not carry fire or spark producing devices into the site
- All MEC operations will use the "Buddy" system
- Prohibit non-essential personnel from visiting and entering the site

3.2 BASIC SAFETY PRECAUTIONS

The following safety precautions are applicable to all MECs:

- Suspend all operations immediately upon approach of an electrical storm.
- Observe the hazards of electromagnetic radiation (EMR) precautions and grounding procedures when working with, or on, electrically initiated or susceptible MEC.
- Do not unnecessarily dismantle, strip, or handle any MEC.
- Avoid inhalation and skin contact with smoke, fumes, dust, and vapors of detonations and MEC residue.

- Do not attempt to extinguish burning explosives or any fire that might involve explosive materials.
- Do not manipulate external features of ordnance items.
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting MEC operations.
- Do not subject MEC to rough handling or transportation. Sand bag, chock, and block appropriately.
- Hand carry no more than two items (one in each hand) at a time and then only as required by the operation being performed.
- Do not transport damaged white phosphorous munitions unless fully submerged in water.
- Avoid unnecessary movement of armed or damaged UXOs.
- Avoid the forward portions of munitions employing proximity fuzing.
- Assume unknown fuzes contain cocked strikers or anti-disturbance features.

3.3 GENERAL SAFETY PRECAUTIONS

The following subsections describe safety precautions for various types of munitions/disposal operations.

3.4 BOMBS

- Ensure fuze wells do not contain fuze components.

3.5 CLUSTERS, DISPENSERS, LAUNCHERS

- Approach and work from the sides of a dispenser.
- Consider an intact dispenser as fully or partially loaded.
- Consider any payloads outside the container or dislodged inside as armed.
- Take precautions for the most hazardous payloads until positively identified.

3.6 PROJECTILES

- Determine if the projectile has been fired and if so, consider it armed.
- Check for the presence of unburned tracers.
- Avoid the rear and front of rocket assisted projectiles.
- Handle projectile components such as powder increments, cartridges, and primers with caution.
- Seal the open ends of projectiles or sheared projectile components with tape or other suitable material before transporting.

3.7 GRENADES

- Do not attempt to re-install safety pins on a dud-fired grenade.
- Do not attempt to withdraw impinged firing pins from the fuze of a dud-fired grenade.
- Do not dispose of grenades by functioning them as designed.

3.8 ROCKETS

- Approach and work on rockets from the side.
- Do not dismantle or strip dud fired rockets or rocket motors.
- Do not expose electrically fired munitions to radio transmissions within 25 feet.
- Do not transport an unfired rocket motor until having shielded the motor igniter from EMR.

3.9 GUIDED MISSILES

- When found, restrict vehicular movement in the area of a guided missile.
- Avoid entanglement with guidance wires of wire guided missiles.
- Restrict radio communications in the vicinity of a dud-fired missile.
- Approach and work on missiles from the side and rear quarter.
- Do not dismantle or strip dud-fired missiles or missile motors.
- Do not transport an unfired missile motor until having shielded the motor igniter from EMR.

4.0 MEC AVOIDANCE FOR SAMPLING AND DRILLING OPERATIONS

MEC avoidance operations may be required in support of soil sampling operations and the drilling of monitoring wells on some contracts. Avoidance operations will consist of a team composed of two UXO qualified personnel. The team will consist of a UXO Technician III and a UXO Technician II or UXO Technician I. The team will not destroy any MEC encountered. All MEC contacts and suspected MEC anomalies will be reported to the Site Manager who will in turn notify the On-site Safety Representative or local Explosive Ordnance Disposal (EOD) unit.

4.1 ACCESS ROUTES TO SAMPLING LOCATIONS

Prior to sampling or well drilling crews going on site, the MEC team will conduct a reconnaissance of the sampling area. The reconnaissance will include locating the designated sampling or drilling location and insuring that it is free of anomalies. If anomalies are detected the point will be relocated as directed in the Work Plan. Once the designated point has been cleared, an access route for the sampling crews, vehicles, and equipment will be cleared. The access route, at a minimum, will be twice the width of the widest vehicle and the boundaries will be clearly marked to prevent personnel from straying into un-cleared areas. If surface MEC is encountered, the MEC team will mark and report the item, and divert the approach path around the MEC. A magnetometer will be used to ensure there are no subsurface MEC within the approach path. If a subsurface magnetic anomaly is encountered, it will be assumed to be a possible MEC and the path will be diverted to avoid the anomaly.

4.2 SOIL SAMPLING AND WELL DRILLING SITES

The MEC team will clear a work site for soil samples and well drilling and clearly mark the boundaries. The area will be large enough to accommodate the drilling equipment and provide a work area for the crews. As a minimum, the cleared area will be a square, with a side dimension equal to twice the length of the largest vehicle or piece of equipment for use on site. If a pre-selected area indicates magnetic anomalies, a new sampling/drilling site will be chosen.

4.3 AVOIDANCE PROCEDURES FOR BOREHOLE SAMPLING

If surface samples are required they will be obtained prior to the start of boring. The borehole procedures will be completed using a hand auger, powered auger, or Direct Push Technology (DPT) equipment. The MEC Team will check the borehole with a down-hole magnetometer, a minimum of every 2 feet, to the deepest sampling depth, or a minimum of 6 feet, to ensure that smaller items of MEC, undetectable from the surface, will be detected.

- **Hand Auger Procedures:** The hand auger will be advanced to the first sampling depth and the auger will be withdrawn. A clean auger bucket will be attached to the handle, returned to the borehole and a sample will be collected. At this point the MEC Team will check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure repeated to obtain the required samples.
- **Power Auger Procedures:** The power auger will be advanced to the first sampling depth and the auger will be withdrawn. A clean hand auger will then be used to collect the sample. The MEC Team will check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure will be repeated to collect the required samples.
- **DPT Procedures:** The DPT rig will be positioned over the sampling point and the rod will be advanced to a maximum depth of 2 feet. The DPT rig will then move a minimum of 20 feet away from the sampling point to prevent the rig from influencing the magnetometer. The MEC Team will then check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure will be repeated to collect the required samples.

4.4 AVOIDANCE PROCEDURES FOR MONITORING WELL INSTALLATION

Prior to drilling equipment being moved to the proposed site, the MEC Team will have checked the designated site, using a magnetometer; to assure that the well location is anomaly free to a depth of 2 feet. If surface samples are required they will be collected prior to the start of drilling. To complete the subsurface magnetometer checks, one of two methods may be used:

- Monitoring, at 2-foot increments, during the actual well drilling operation. This will require the withdrawal of the drill rod or augers from the well and moving the drill rig a minimum of 20 feet away from the well location to prevent the rig from influencing the magnetometer, or
- Installing an offset monitoring hole within 2 feet of the well location. This monitoring hole can be installed by the MEC Team, with a hand or power auger, and monitored at 2-foot increments to the desired well depth or a minimum of 6 feet. This will then allow uninterrupted well installation and/or sampling to continue.

5.0 MEC AVOIDANCE AND CONSTRUCTION SUPPORT

MEC avoidance support is normally comprised of a two-man team consisting of a UXO Technician III (Team Leader) and a UXO Technician II. At sites where the expectation of encountering MEC is low, the MEC support may only consist of the UXO Technician III as MEC safety escort. The intent of MEC avoidance is to detect and avoid MEC and UXO. The following paragraphs outline minimum procedures for the designated operations.

5.1 LOCATION SURVEYS AND GEOPHYSICAL ESCORT

MEC escort for survey and geophysical operations consists of a visual surface search for MEC. Any UXO or MEC encountered will be marked, avoided, and reported to the appropriate authorities. Prior to driving stakes for grid corners or installing monuments, the UXO Technician will search the location with a

magnetometer. Any subsurface anomaly will be assumed to be MEC and an alternate anomaly-free location will be chosen.

5.2 TRENCHING AND PIT EXCAVATIONS

Prior to trenching or excavation crews going on site, the MEC Team will conduct a reconnaissance of the approach route to the site. The reconnaissance will include locating a clear path for the crews, vehicles, and equipment. The approach path, at a minimum, will be twice the width of the widest vehicle. The boundaries of the approach path will be clearly marked to prevent personnel from straying into un-cleared areas. If MEC is encountered, the MEC team will mark and report the item, and divert the approach path around the MEC. Personnel will be instructed to remain within the marked boundary limits. A magnetometer will be used to search for near surface anomalies within the approach path. If a magnetic anomaly is encountered, it will be assumed to be a possible MEC, it will be marked, the approach path diverted, and reported.

5.3 EXCAVATION

During excavation operations the UXO Technician(s) will position themselves near (outside the reach of the swing) the earth moving machinery (EMM) (backhoe) where they can observe the excavation. If UXO or MEC is spotted the UXO Technician will signal the EMM operator to stop digging, move the bucket and place it on the ground outside the trench, and remove his hands from the controls. The UXO Technician will then investigate the MEC, which will be handled in accordance with Section 6.0. If MEC that cannot be moved is encountered the excavation operations will be either relocated to another area of operations or suspended until the item is disposed of or rendered safe to move.

5.3.1 HEAVY EQUIPMENT OPERATION

Heavy equipment safety will be in accordance with the SSHP.

5.3.2 EXCAVATION SAFETY

Excavation safety will be in accordance with the SSHP.

5.3.3 EQUIPMENT

The minimum equipment requirements for this activity include:

- Level D PPE
- EMM, (trenching & excavation)
- Schonstedt GA-52CX Magnetometer
- Marking material listed in Table 1
- Miscellaneous common hand tools (e.g. hammer, shovel, etc.)

Table 1: Color Codes – MEC Avoidance

Color	Used to Mark
Red Pin Flag/Caution Tape	Danger, identified suspect MEC/UXO, special precaution required
White Pin Flag	Boundary or temporary marker
Green Paint	Marking MEC-related scrap

6.0 LIVE AND SUSPECT MEC

UXO or MEC items encountered a will be inspected by the UXO Technician(s). Items that are safe to move may be relocated to a bermed or sandbagged area a safe distance from ongoing operations. No items will be moved unless positively identified and determined safe to move. The item(s) will be marked and reported to the Site Manager. MEC encountered that is ***NOT*** safe to move will be marked in place and operations will be moved to another location. MEC will be marked by installing four wooden stakes and encircling the stakes with flagging tape (see Table 1). Prior to installing stakes the location will be checked with a magnetometer to avoid driving the stake into a subsurface anomaly. All live and suspect live items will be inspected and identified by UXO Technicians. If the item cannot be positively identified and determined to be inert and safe to move, it will be marked and reported.

Note: If during identification of UXO or MEC it becomes necessary to move or handle the item, non-UXO qualified personnel will move to a safe distance, as specified in the site Work Plan.

6.1 MEC-RELATED MATERIAL

Adjacent to each operating area, the UXO Technicians will establish a munitions debris collection point. During operations, items that are free of explosive contamination (e.g., fragments, parachutes, etc.) will be placed into these collection points and marked (see Table 1). Upon completion of operations, the materials in these temporary collection points will be transferred to a central collection point for disposal. As the material is being loaded, the UXO Technician(s) will perform a second inspection of the material to ensure it is free of explosives and other hazardous materials.

7.0 DISPOSAL OPERATIONS

All MEC and Material Potentially Presenting and Explosive Hazard (MPPEH) will be disposed of in accordance with the Scope of Work (SOW) and/or the Work Plan. All hazardous material encountered will be reported to the Site Manager for disposition.

8.0 SUMMARY

USAE uses proven procedures and methods to provide MEC Support Services. Only qualified UXO personnel will perform tasks associated with MEC location, identification, and item condition determination. The procedures outlined in this SOP are based on industry standards and ensure that operations are safely and efficiently performed.

9.0 REFERENCES

- EP 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations
- EP 75-1-2, UXO Support during HTRW and Construction Activities

- USAE Corporate Safety and Health Program (CSHP)
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards
- OSHA, 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement
- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 385-40 w/USACE supplement, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications
- USAE SOPs

Chapter 14

STANDARD OPERATING PROCEDURE - HSP-16
PERSONAL PROTECTIVE EQUIPMENT PROGRAM

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide USA Environmental, Inc. (USAE) personnel with general guidelines and procedures for the selection and use of personal protective equipment (PPE). In accordance with Occupational Safety and Health Administration (OSHA) standards, USAE will, whenever possible, use engineering controls or other means to control personnel exposures to chemical and physical hazards encountered during operations conducted on hazardous waste and unexploded ordnance (UXO) or munitions and explosives of concern (MEC) sites. When engineering controls or other protective measures are not feasible or adequate, this program will be used to select the PPE necessary to ensure the health and safety of site personnel.

2.0 SCOPE

This program will be applicable to USAE projects conducted on hazardous waste or UXO/MEC sites where PPE is required and used. The provisions of this program apply to all USAE and subcontractor personnel who perform operations where PPE is required by the Accident Prevention Plan (APP) with Site Safety and Health Plan (SSHP).

3.0 RESPONSIBILITIES

3.1 OCCUPATIONAL SAFETY MANAGER

The Occupational Safety Manager (OSM) is responsible for the overall implementation of the program, and for management of the USAE resources needed for its implementation, as well as for the final review and approval of this program.

The OSM is also responsible for the continued development and review of this program, and for providing consultation and supervision to the Site Safety and Health Officer (SSHO)/Unexploded Ordnance Safety Officer (UXOSO) regarding the PPE to be used for protecting personnel from the chemical and physical hazards found on site. In addition, the OSM is responsible for the following:

- Reviewing newly developed or improved PPE, in order to identify products that may afford a higher degree of protection or provide a level of protection not previously available.
- Conducting a task hazard assessment for each task conducted on site, and identifying the chemical and physical hazards from which site personnel will require protection.
- Completing the Certification of Task Hazard Assessment form for each task conducted on site.
- Creating, and incorporating into the SSHP, outlines for PPE to be used for each task conducted on site.
- Periodically inspecting the USAE project sites, in order to ensure that the provisions of this program are being implemented.

3.2 SITE SAFETY AND HEALTH OFFICER/UNEXPLODED ORNDNANCE SAFETY OFFICER

The SSHO/UXOSO is responsible for the on-site implementation of this program. To this effect, the SSHO/UXOSO will be responsible for the following:

- Providing initial training, as specified in Paragraph 5.0 of this program, to inform site personnel of the selection, use, limitations, and maintenance of PPE used on site.

- Issuing PPE in accordance with the provisions of the SSHP.
- Assisting site personnel with the inspection and maintenance of PPE.
- Consulting with the OSM to determine the levels and types of PPE to be used for tasks not previously addressed in the SSHP.
- Completing the Certification of Task Hazard Assessment form for any new tasks which were not previously addressed in the SSHP.
- Conducting daily inspections and weekly audits of the site, in order to ensure that site workers are complying with this program and SOP.

4.0 SELECTION OF PPE

4.1 INTRODUCTION

Each task outlined in the Statement of Work (SOW) will be assessed prior to its initiation to determine the risk of personnel exposure to safety and health hazards which may be encountered during its conduct. The hazard assessment will be based on available information pertaining to the historical use of the site, site contaminant characterization data, and the anticipated operational hazards. This information will either be provided by the client or collected by USAE site personnel. The PPE assigned as a result of the hazard assessment represents the minimum PPE to be used during initial site activities. Since hazard/risk assessment is a continuing process, changes in the initial types and levels of PPE will be made in accordance with information obtained from the actual implementation of site operations and data derived from the site monitoring. As a general rule, the levels of PPE will need to be reassessed if any of the following occur:

- Commencement of a new work phase, such as the start of drum sampling or work that begins on a different portion of the site
- Change in job tasks during a work phase
- Change of season/weather
- Temperature extremes or individual medical considerations that limit the effectiveness of PPE
- Encountering of contaminants other than those previously identified
- Change in ambient levels of contaminants
- Change in work scope that affects the degree of contact with contaminants

If work tasks are added or amended after completion and approval of the SSHP, the SSHO/UXOSO will conduct the task hazard assessment and consult with the OSM. The level and type of PPE to be used will be identified, and the SSHO/UXOSO will complete the Certificate of Task Hazard Assessment form. Any changes in PPE that involve downgrading the level of PPE will be allowed only after review by the OSM.

4.2 SELECTION CRITERIA

The OSM and SSHO/UXOSO will utilize the general chemical resistance information found in Table 1 and Appendix B, the manufacturer's permeation and breakthrough specifications, the requirements outlined in Appendix A, and the anticipated chemical and physical hazards, to select the level and types of PPE to be used for each task.

During the selection of PPE, the OSM and SSHO/UXOSO will also take into consideration the following factors:

- Limitations of the equipment
- Work mission duration
- Temperature extremes
- Material flexibility
- Durability/integrity of the equipment

Once the specific types of PPE have been selected for each task, the SSHO/UXOSO and OSM will ensure that the items purchased will properly fit each employee designated to wear PPE.

Selection of respiratory protection will be conducted in accordance with the Respiratory Protection Program. Specific limitations of the PPE selected for site use will be outlined in each SSHP.

5.0 TRAINING

All USAE, contractor, or subcontractor site personnel will be given initial PPE-specific training that complies with this section. This training will be given by the SSHO/UXOSO or OSM prior to personnel participating in site operations where PPE is required. This, and all other subsequent PPE training, will include the relevant topics outlined in Paragraph 5.2 of this program.

Site personnel will be given additional PPE training whenever any of the following occur:

- The SSHO/UXOSO has reason to believe that a previously trained employee's knowledge or use of assigned PPE indicates that the employee has not retained the requisite skill or understanding needed to properly use the PPE in question.
- Changes in the work place render previous training obsolete.
- Changes in the types of PPE to be used render previous training obsolete.

5.1 REQUIRED TRAINING TOPICS

USAE will provide all affected site personnel with PPE training that covers the following topics:

- The decisions and justifications used to select each piece of PPE
- The nature of the hazards, and the consequences of not using PPE
- What PPE will be required for the conduct of each task
- When PPE will be required during the performance of each task
- How to properly don, doff, adjust, and wear each piece of PPE
- The proper inspection, cleaning, decontaminating, maintenance, and storage of each PPE item used
- The limitations of the PPE

All personnel receiving PPE training will be required to demonstrate an understanding of the training topics and the ability to correctly use the PPE. This will be accomplished through the SSHO/UXOSO supervising and visually inspecting each individual's ability to properly don and use the PPE during its initial use.

Upon completion of the training and after each employee has successfully demonstrated the requisite understanding, the SSHO/UXOSO will complete the employees who attended the training course and successfully demonstrated the required knowledge, the date(s) of the training and demonstration session(s), and the PPE covered by the training session.

6.0 LEVELS OF PPE

The following paragraphs outline the different levels of PPE that may be used by USAE personnel during the conduct of site activities. The levels described do not identify specific makes, types, or brands of PPE, since that information is site-specific and directly related to the nature and degree of hazards and contaminants which may be encountered at each site. These levels of PPE provide a general guideline, and may be modified to address site-specific hazards and contaminants. Information related to the OSHA mandated requirements for different types of PPE is outlined in Appendix A of this procedure, and may be referenced when selecting specific PPE required for each level, described below.

6.1 SPECIAL CONSIDERATIONS

The following special considerations shall be observed in the selection of PPE for the levels discussed below:

- Hard hats are not required unless working around heavy equipment, or an overhead hazard exists.
- Steel toe/shank boots are not required during surface/subsurface location of UXO unless a serious toe hazard exists, in which case a composite safety toe will be used.
- Safety glasses, goggles, and face shields will be required only when an eye hazard exists, such as the potential for flying objects, chemical splash, or contact with sharp objects.
- When required, eye protection will be selected which provide site personnel with the best protection from not only physical hazards, but also ultra-violet radiation.
- The OSHA standards for PPE selection are vague concerning selection of some types of specific PPE; therefore, USAE will continually evaluate site tasks to identify hazards, and will provide any PPE necessary to ensure the safety and health of site personnel, regardless of the activity they perform.

6.2 LEVEL D PPE

This level of PPE is not allowed in areas of the site where atmospheric hazards are known or expected to exist. Level D should be worn only if the activity in which personnel are engaged does not have the potential for splash, immersion, or any other contact with hazardous substances. Level D involves the use of the following PPE:

- Work clothes or coveralls (cotton)
- Leather work gloves (optional unless hand hazards exist)
- Leather work boots (with safety toe when required)
- Hard hat (when working around heavy equipment or overhead hazards)
- Safety glasses (optional unless eye hazards exist)
- Two-way radio, one per team

6.2.1 MODIFIED LEVEL D PPE

Modified Level D affords protection from casual contact with contaminated soils and materials, but should be worn whenever there is a potential for overexposure to airborne hazardous substances. Modified Level D involves the use of the following PPE:

- Chemical-resistant suit with attached booties
- CBRN approved mask (if the potential for airborne exposure exists)
- Chemical-resistant boot covers
- Gloves – cotton lined inner, latex inner, and chemical-resistant outer
- Boots – leather work (with safety toe when required)
- Hard hat (when working around heavy equipment or overhead hazards)
- Eye protection – safety glasses or goggles
- Two-way radio, one per team

6.3 LEVEL C PPE

Level C affords moderate protection from airborne hazards, and should be worn during site activities where the potential exposure to hazardous substances may exceed the OSHA PEL or other published exposure limits. If, however, this level of PPE is used on a known or suspect chemical warfare materiel (CWM) site, this level of protection is not acceptable, since there are no air-purifying respirator cartridges approved for use against CWM. Level C with an air-purifying respirator can only be used for protection against chemicals for which NIOSH/MSHA approved cartridges exist. Level C will involve the use of the following PPE:

- Chemical-resistant suit with attached booties and hood
- Full-face air-purifying respirator with appropriate filters (NIOSH/MSHA approved for CBRN use)
- Chemical-resistant boot covers
- Gloves – cotton liner inner, latex inner, and chemical-resistant outer
- Boots – leather work (with safety toe when required)
- Hard hat (when working around heavy equipment or overhead hazards)
- Two-way radio, one per team

6.4 LEVEL B PPE

Level B PPE offers superior protection against the inhalation of airborne contaminants. This is due to the fact that supplied-air or Self Contained Breathing Apparatus (SCBA) respirators are used as the respiratory protection for this level. However, the type of protective suit used with this level of protection is not air-tight, and skin exposure to hazardous vapors is possible. Therefore, this level of protection is not acceptable for use where contact with liquids or vapors which are extremely toxic or corrosive to the skin is anticipated. This level should not be used if the site contains CWM agents, which present a serious safety or health threat via dermal contact. Level B can, however, be used at CWM sites under conditions where: 1) the CWM and other chemical hazards of concern are not acutely skin-toxic; 2) there is no potential for liquid contact, and vapor levels are being continuously monitored; and 3) it is needed to protect site workers from non-CWM hazardous wastes. Level B will involve the use of the following PPE:

- Chemical-resistant encapsulating or non-encapsulating suit
- SCBA or Supplied Air (NIOSH/MSHA approved)
- Coveralls or scrubs – cotton
- Chemical-resistant boot covers
- Gloves – cotton lined inner, latex inner, and chemical-resistant outer
- Hard hat (when working around heavy equipment or overhead hazards
- Boots – leather work (with safety toe when required)
- Two-way radio, one per team

6.5 LEVEL A PPE

Level A PPE provides the highest available level of protection against both inhalation and skin contact of extremely hazardous materials. The Level A suit is fully-encapsulating; but unlike the Level B encapsulating suit, the Level A suit is air-tight and must be tested prior to use in order to ensure that hazardous gases and vapors do not leak into the suit. Since the Level A suit is usually worn in areas where highly toxic and corrosive materials are know to exist, it must be constructed of materials capable of resisting degradation and permeation by the chemicals of concern, including CWM agents. Permeation and breakthrough data for the Level A suit to be used must show that it is capable of resisting the chemicals expected to be found at the site. Since the Level A suit affords the greatest level of protection to dermal hazards, it will be worn in all instances where potential for contact with liquid CWM exists, or when the nature and degree of potential exposure are unknown. Level A will also be worn in the event that site personnel are exposed to and overcome by CWM or other materials, and require rescue. Level A will involve the use of the following PPE:

- SCBA, Supplied Air, or a combination of both (NIOSH/MSHA approved)
- Fully-encapsulating chemical protective suit with attached boots and gloves
- Coveralls or scrubs – cotton
- Gloves – cotton lined inner, latex inner, and chemical-resistant outer
- Boots – leather work (with safety toe when required)
- Chemical-resistant boot covers (optional
- Disposable protective suit worn over fully-encapsulating suit (optional)
- Hard hat (when working around heavy equipment or overhead hazards)
- Two-way radio, or an equivalent communication system (worn inside encapsulating suit), one for each team member

Note: Level A suits are to be worn only when the known chemicals/vapors are highly toxic to skin contact, or when the nature and level of exposure is unknown or unmeasurable. Therefore, the structural integrity and air-tightness of the suit and its seams, zippers, and glove seals are extremely important. To ensure air-tightness of the suit, it should be tested in accordance with the manufacturer's requirements and the requirements found in Appendix A of 29 CFR 1910.120.

7.0 PPE DONNING PROCEDURES
7.1 INTRODUCTION

The purpose of the PPE donning procedures outlined in this section is to ensure that site personnel don the required PPE in a manner that will afford the greatest degree of protection. Failure to adhere to these procedures may result in the clothing and/or PPE being ineffective against potential contamination. The general donning procedures are given as a guide, and may be altered by the SSHO/UXOSO if the improvements are warranted by site operations and approved by the OSM.

7.2 GENERAL REQUIREMENTS

This paragraph contains general procedures and requirements for donning all levels of PPE. Specific procedures for donning each level of PPE are discussed in the paragraph immediately following the description of the PPE level. The general procedures/ requirements are as follows:

- Prior to donning, gather the PPE required for performing the task specified for the day's operations.
- Issuance of respiratory equipment will be through the SSHO/UXOSO or his designated representative only.
- Always inspect protective gloves, boots and boot covers, outer garment, and respiratory protective equipment for proper fit, integrity (i.e., rips, tears, holes), and function.
- If wearing a level of PPE other than Level A, and a small tear/rip is noticed during initial inspection or while engaged in site activities, it may be repaired using a small piece of tape.
- If a tear/rip in protective clothing cannot be repaired with a small piece of tape, or if the tear/rip compromises the structural integrity of the clothing, that article of clothing will be replaced, even if this involves leaving the EZ to do so.
- Whenever protective boots and boot covers or gloves are not part of the outer garment, use duct tape (or an equivalent) to connect the clothing to the gloves at the wrist and to the boots at the leg.
- When taping boots or gloves to the suit, do not wrap the tape too tightly, as this can cut off circulation and restrict movement. The goal is to simply attach the two, to eliminate a route of entry for chemicals into the suit or gloves.
- Whenever using tape, always leave a folded tab, placed where it is visible and accessible for ease of removal.
- If planned site activities will require walking, arm movement, or bending, it is best to place tape over the zipper and over seams at the stress points in the crotch, armpits, and back (where the shoulder seam and hood seam meet).
- If kneeling will be necessary during site activities, avoid kneeling on any contaminated surfaces, and place tape over the knee areas to reduce the possibility of tearing or wearing out the knees.
- Consult with the SSHO/UXOSO for any other improvements that would make the suit sturdier and/or improve the comfort of the suit.

7.3 DONNING PROCEDURES FOR MODIFIED LEVEL D

To don Modified Level D, keep in mind the general recommendations above, and put on the PPE utilizing the steps listed below:

- Put on chemical/splash resistant protective suit (suit should have attached booties).

- Put chemical-resistant boots on over the booties, and tape the boots to the suit.
- Make any strengthening modifications to the suit, as deemed necessary by the planned site activities.
- Assemble and adjust all other PPE (hard hat, safety glasses, splash shield, etc.), and proceed toward the CRZ access point.
- If ear plugs are to be worn, insert them before putting on inner and outer gloves, or any other PPE that might obstruct the proper insertion of the plugs.
- Don all other PPE (hard hat, safety glasses, splash shield, etc.), saving the inner and outer gloves for last.
- Put on inner and outer glove of one hand and have buddy tape that hand, then tape one of the buddy's gloved hands, and so on, until both hands are gloved and taped.
- Proceed to the EZ access control point to be checked by the EZ access control attendant prior to being cleared for entry.

7.4 DONNING PROCEDURE FOR LEVEL C PPE

To don Level C, follow the general consideration listed in Paragraph 7.2, and then follow the steps listed below:

- Put on chemical/splash resistant protective suit (suit should have attached booties and hood).
- Put chemical-resistant boots on over the booties, and tape the boots to the suit.
- Make any strengthening modifications to the suit, as deemed necessary by the planned site activities.
- Report to the SSHO/UXOSO, or the designated representative, to check out the proper respirator and cartridge assembly.
- Assemble and adjust all other PPE (hard hat, safety glasses, splash shield, etc.), and proceed toward the CRZ access point.
- If ear plugs are to be worn, insert them before putting on inner and outer gloves, respirator, or any other PPE that might obstruct the proper insertion of the plugs.
- Assemble respirator and cartridges, and inspect the assembly for proper cleanliness and function.
- Don the respirator, and conduct negative and positive pressure fit tests to ensure that the mask is not leaking.
- Don all other PPE (hard hat, safety glasses, splash shield, etc.), saving the inner and outer gloves for last.
- Put on inner and outer glove of one hand and have buddy tape that hand, then tape one of the buddy's gloved hands, and so on, until both hands are gloved and taped.
- Proceed to the EZ access control point to be checked by the EZ access control attendant prior to being cleared for entry.

7.5 DONNING PROCEDURES FOR LEVEL B PPE WITHOUT ENCAPSULATING SUIT

The donning procedure outlined in this paragraph applies to Level B with a non-encapsulating suit. The donning procedures to be followed for Level B with a fully-encapsulating suit are the same as those

outlined for Level A in Paragraph 7.6. To don Level B with a non-encapsulating suit, follow the general considerations listed in Paragraph 7.2, and then follow the steps listed below:

- Report to the SSHO/UXOSO, or the designated representative, to check out the proper SCBA respirator assembly.
- Assemble and inspect the SCBA system for cleanliness and function.
- Make sure that all required PPE have been assembled at the location where it is to be donned, and make any adjustments to the equipment prior to starting the donning process.
- While sitting, insert one leg after the other into the encapsulating suit, stand, and don the suit (suit should have attached booties and gloves).
- While sitting again, put chemical-resistant boots on over the booties, and tape the boots to the suit.
- Put on the air tank/harness assembly, adjust for a comfortable, snug fit, and turn on the air at the tank, after first making sure the regulator valve is closed.
- If ear plugs are to be worn, insert them now, before putting on the respirator face piece or any other PPE that might obstruct the proper insertion of the plugs.
- Don the SCBA face piece (do not connect the air line at this time), and conduct negative- and positive-pressure fit tests to ensure that the mask is not leaking.
- Put on glove liners, inner gloves, and outer gloves, and tape gloves to suit.
- While connecting SCBA to the face piece, turn on the regulator valve and check air flow and breathing usability of the unit.
- Once the suit and SCBA are situated and assistant has checked to ensure that the wearer is breathing freely, the assistant will put the hard hat on wearer.
- Proceed to the EZ access control point to be checked by the EZ access control attendant prior to being cleared for entry.

7.6 DONNING PROCEDURE FOR LEVEL A AND FULLY-ENCAPSULATING LEVEL B PPE

To don Level A or Level B with an encapsulating suit, follow the general considerations listed in Paragraph 7.2, then follow steps listed below:

- Report to the SSHO/UXOSO, or the designated representative, to check out the proper SCBA respirator assembly.
- Assemble and inspect the SCBA system for cleanliness and function.
- Make sure that all required PPE have been assembled at the location where it is to be donned, and make any adjustments to the equipment prior to starting the donning process.
- While sitting, insert one leg after the other into the encapsulating suit, stand, and pull it up to the waist (suit should have attached booties and gloves).
- While sitting again, put chemical-resistant boots on over the booties, and tape the boots to the suit.
- Put on the air tank/harness assembly, adjust for a comfortable, snug fit, and turn on the air at the tank, after first making sure the regulator valve is closed.
- If ear plugs are to be worn, insert them now before putting on the respirator face piece or any other PPE that might obstruct the proper insertion of the plugs.

- Don the SCBA face piece (do not connect the air line at this time), and conduct negative- and positive-pressure fit tests to ensure that the mask is not leaking.
- Put on glove liners and inner gloves, and then put on hard hat.
- While connecting SCBA to the face piece, turn on the regulator valve and check air flow and breathing usability of the unit.
- Insert the arms into the sleeves, being sure hands fit into the gloves properly, and have the assistant "work" the suit over the SCBA, face piece, and hard hat.
- Once the suit is situated and the assistant checks to ensure that the wearer is breathing freely, the assistant will zip the suit and check all closures and valves.
- Proceed to the EZ access control point to be checked by the EZ access control attendant prior to being cleared for entry.

8.0 INSPECTION PROGRAM

8.1 INSPECTING INCOMING SHIPMENTS OF PPE

The SSHO/UXOSO, or a designated appointee, will inspect all incoming shipments of PPE received from the USAE home office, the manufacturer, or the distributor. This inspection will include checking the shipment for correctness of size, quantity, material, and quality. Any deficiencies should be noted, and defective material returned to the supplier.

8.2 PRE-DONNING INSPECTION

Prior to donning PPE, site personnel will thoroughly inspect each piece of PPE to determine if it is in proper working order, and to ensure that the item will be capable of protecting the employee from site hazards. As applicable, site personnel will check the following when pre-donning inspections are conducted:

- Chemical-Resistant Clothing (e.g., suits, gloves, boots, etc.)
  - Check that clothing is made of proper material
  - Visually check seams, coating, and zippers, and look for tears
  - Check gloves and boots for pin holes
  - Stretch material to check flexibility, and to look for cracks
- Eye, Face, and Head PPE
  - Ensure that equipment is ANSI-approved
  - Check that hard hats are in good condition, with no cracks or chemical/material buildup visible
  - Check hard hat head band for proper function and completeness
  - Ensure that all eye/face/head PPE fits comfortably and securely
  - Check safety glasses and face shields for cracks or scratches that could impair vision or compromise structural integrity
  - Check safety glasses for side shields
- Fully-Encapsulating Suits
  - Check operation of pressure relief valves and fitting of suit
  - Check face shield for cracks, glazing, or fogging
  - Ensure that suit passes pressure test
  - Visually check seams, coating, and zippers, and look for tears
  - Check gloves and boots for pin holes
  - Stretch material to check flexibility, and to look for cracks

- Respirators
  - Inspect in accordance with USAE Corporate Safety and Health Program (CSHP) SOP on Respiratory Protection

8.3 PERIODIC INSPECTIONS

During the work task, buddy teams should periodically inspect each other's PPE for evidence of chemical attack, such as discoloration, swelling, stiffening, or softening. Also check for closure failure, tears, punctures, and seam discontinuities. If defective or deficient PPE is identified, it will be repaired or replaced immediately.

9.0 CLEANING AND DECONTAMINATION

The SSHO/UXOSO will be responsible for ensuring that PPE is in good, clean, working order prior to issuing the PPE the first time. Once issued, site personnel will ensure that re-usable articles of PPE are maintained in a clean, sanitary fashion. For items used inside an EZ, site personnel will follow the requirements of the Site-Specific Decontamination Plan, and ensure that the PPE is properly decontaminated before removing the item from the EZ or CRZ.

10.0 MAINTENANCE

Maintenance of PPE can vary greatly, based upon the complexity of the PPE and the intricacy of the repair involved. The SSHO/UXOSO will become familiar with the manufacturer's recommended maintenance and, when possible, repair defective PPE. If unable or unauthorized to conduct the repair, the SSHO/UXOSO will return the item to the manufacturer for repair, or to procure a replacement.

11.0 STORAGE

PPE will be stored in a location which is protected from the harmful effects of sunlight, damaging chemicals, moisture, extreme temperatures, impact, or crushing. If needed, the SSHO/UXOSO will designate a specified area for the storage of PPE.

12.0 REFERENCES

- USAE Corporate Safety and Health Program
- OSHA, 29 CFR 1910, Occupational Safety and Health
- OSHA, 29 CFR 1926, Construction Standards
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/U.S. Environmental Protection Agency (USEPA), Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities
- American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)

13.0 ATTACHMENTS
13.1 APPENDIX A – SPECIFICATONS FOR INDIVIDUAL TYPES OF PPE
13.2 APPENDIX B – PROTECTIVE CLOTHING MATERIAL GUIDE

USAE CERTIFICATION OF PERSONAL PROTECTIVE EQUIPMENT (PPE) TRAINING

SITE INFORMATION	
Site Name:	
Location:	Instructor(s):
Date of Classroom Instruction:	Date of Demonstration:

PPE TRAINING COURSE ATTENDANTS

The following personnel have attended the site PPE training course, and demonstrated, through use, an understanding of the donning/doffing procedures, inspection, cleaning, maintenance, storage, limitations, and proper disposal of the PPE listed on this certificate. These personnel are now qualified to use the site- and task-specific PPE, as required by the SSHP.

Name	Organization	Name	Organization

TYPES AND LEVELS OF PPE ADDRESSED DURING TRAINING

Trainer's Initials	Personal Protective Equipment Reviewed	Trainer's Initials	Personal Protective Equipment Reviewed

CERTIFICATION

I the undersigned do hereby certify that the above listed personnel have received the requisite training and successfully demonstrated their ability to use the PPE listed above, in accordance with the USAE Personal Protective Equipment Program.

Name (printed)	Signature:	Date:

TABLE 1: COMPARATIVE CHEMICAL RESISTANCE

KEY: E-EXCELLENT; G-GOOD; F-FAIR; P-POOR; NR-NON RECOMMENDED; *-LIMITED SERVICE

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
A				
*Acetaldehyde	E	G	G	E
Acetate	G	F	P	G
Acetic acid	E	E	E	E
*Acetone	G	E	P	E
Acetylene gas	E	E	E	E
Acetylene tetrachloride	F	NR	F	F
Acrylonitrile	G	F	F	G
Amidol	G	E	F	E
Amine hardeners	F	F	G	G
Ammonium hydroxide	E	E	E	E
*Amyl acetate	F	P	P	F
Amyl alcohol	E	E	E	E
Anhydrous ammonia	G	E	E	E
Aniline	G	F	P	F
Aniline hydrochloride	F	G	P	F
Aniline oil	F	G	P	F
Animal fats	E	P	E	G
Animal oils	E	F	E	G
Anodex	G	E		E
Anthracene	F	P	F	P
*Aromatic fuels	P	NR	F	NR
Arsine	E	E	E	E
Asbestos	E	E	E	E
Asphalt	G	F	E	F
B				
Banana oil	F	P	P	F
*Benzaldehyde	F	F	G	G
*Benzene	P	NR	F	NR
Benzol	P	NR	F	NR
Benzyl alcohol	E	E	E	E
Benzyl benzoate	G	F	G	F
*Benzyl chloride	F	P	F	G
Blacosolve	G	P	G	P
Boron tribromide	G	P	P	P
Bromine	G	P	P	P
Bromoterm	G	P	P	P
Butane	E	F	E	F
2-Butanone	G	G	F	G
Butyl acetate	G	F	P	F
Butyl alcohol	E	E	E	E
*Butylaldehyde	G	G	E	G
Butylene	E	G	E	G

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
C				
*Cadmium oxide fume	E	E	E	E
Calcium hydroxide	E	E	E	E
Carbolic acid	E	E	F	E
Carbon dioxide	E	E	E	E
Carbon disulfide	F	F	F	F
*Carbon tetrachloride	F	P	G	P
Castor oil	F	P	E	F
Celiosolve	F	G	G	G
Celiosolve acetate	G	F	G	G
Chlordane	G	F	G	F
Chlorine	G	F	F	G
Chlorine gas	G	F	F	G
*Chlorobenzene	F	P	P	F
*Chloroacetone	F	F	P	E
Chlorobromomethane	F	P	F	P
*Chloroform	G	P	E	P
Chloronaphthalene	F	P	F	F
Chlorophenylene diamine	G	P	F	F
Chloropicrin	P	P	P	F
*Chlorothene	P	NR	F	NR
Chromic acid	F	P	F	F
Chromotex	G	G	G	G
D				
Decaborane		P	F	F
Degreasing fluids		P	G	P
Diacetone alcohol		E	E	E
Diborane		P	F	F
*Dibetyl ether		G	F	G
*Dibutyl phthalate		P	G	G
Dichloroethane		NR	F	NR
Dichloropropene		P	F	F
Diesel fuel		P	E	P
Diethanolamine		G	E	E
Diethylamine		G	E	G
Diethyltriamine		F	E	G
Diisobutyl ketone		F	P	G
Diisocyanate		P	G	E
Dimethylformamide		F	G	G
Dioctyl phthalate		P	E	F
Dioxane		G	G	G

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
E				
Emulsifying agent	G	F	E	E
Emulthogene	G	F	G	E
Epichlorohydrin	G	P	F	G
Epoxy resins dry	E	E	E	E
*Esters	F	P	P	F
Ethane gas	E	G	E	E
Ethanol	E	E	E	E
Ethers	E	G	G	G
*Ethyl acetate	G	F	F	G
Ethyl alcohol	E	E	E	E
Ethyl bromide			P	
Ethyl ether	E	G	G	E
Ethyl butyl ketone			P	
Ethyl formate	G	F	G	G
Ethylaniline	F	F	P	G
Ethylenediamine	E	G	E	G
Ethylene dichloride	F	P	P	F
Ethylene gas	E	G	E	E
Ethylene glycol	E	E	E	E
Ethylene oxide	G	F	G	
Ethylene trichloride	F	P	G	P
F				
Fatty acids	E	P	E	F
Ferrocyanide	F	G	G	E
Fluoric acid	E	G	E	E
Fluorine	G	F	F	G
Fluorine gas	G	F	F	G
Formaldehyde	E	E	E	E
Formic acid	E	E	E	E
Freon 11	G	P	G	F
Freon 12	G	P	G	F
Freon 21	G	P	G	F
Freon 22	G	P	G	F
*Furfural	G	G	G	G
G				
Gasoline - leaded	G	P	E	F
Gasoline - unleaded	G	P	E	F
Glycerine	E	E	E	E
Glycerol	E	E	E	E
Glycol	E	E	E	E
Gold fluoride	G	E	E	E
Grain alcohol	E	E	E	E

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
H				
Halogens	G	F	F	G
Hexamethylenetetramine	F	G	F	G
Hexane	F	P	G	P
Hexyl acetate	F	P	P	F
Hydraulic oil				
ester base	E	P	F	G
petroleum base	G	P	E	P
Hydrazine	F	G	G	G
Hydrochloric acid	E	G	G	G
Hydrofluoric acid	E	G	G	G
Hydrogen gas	E	E	E	E
Hydrogen peroxide--30%	G	G	G	G
Hydrofluosilicic acid	F	G	G	G
Hydroquinone	G	G	F	G
I				
Inorganic salts	E	E	E	E
Iodine	G	F	G	G
Isooctane	F	P	E	P
Isopropanol	E	E	E	E
Isopropyl alcohol	E	E	E	E
K				
Kerosene	E	F	E	F
Ketoners	G	E	P	E
L				
Lacquer thinners	G	F	P	F
Lactic acid	E	E	E	E
Lautric acid	E	F	E	E
Lineoleic acid	E	P	E	F
Linseed oil	E	P	E	F

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
M				
Maleic acid	E	E	E	E
Mercuric chloride	G	E	G	E
Mercury	G	G	G	E
Methane gas	E	E	E	E
Methanol	E	E	E	E
Methyl acetate	G	F	P	G
Methyl alcohol	E	E	E	E
Methylamine	F	F	G	G
Methyl bromide	G	F	F	G
Methyl celiosolve	G	G	G	G
*Methyl chloride	NR	NR	NR	NR
*Methyl ethyl ketone	G	G	NR	E
Methyl formate	G	F	F	G
Methylene bromide	G	G	F	G
Methylene chloride	G	F	F	G
*Methyl isobutyl kelone	F	F	P	E
Methyl methacrylate	G	G	F	E
Mineral oils	E	F	E	F
*Monochlorobenzene	F	P	P	F
Monoethanolamine	E	G	E	E
Morpholine	E	E	G	E
Muriatic acid	E	G	G	E
N				
Naphthalene	G	F	G	F
Naphthas aliphatic	E	F	E	F
Naphthas, aromatic	G	P	G	P
*Nitric acid	G	F	F	F
*Nitric acid, red and white fuming	P	P	P	P
*Nitrobenzene	F	P	F	F
*Nitroethane	F	P	F	F
Nitrogen gas	E	E	E	E
*Nitromethane	F	P	F	F
*Nitropropane	F	P	F	F
Nitrous oxide	G	Q	G	G
O				
Octyl alcohol	E	E	E	E
Oleic acid	E	F	E	G
Oxalic acid	E	E	E	E
Oxygen liquid	F	P	NR	F
Ozone	G	P	P	G

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
P				
Paint thinners	G	F	G	F
Paint and varnish removers	G	F	F	F
Palmitic acid	E	E	E	E
*Paradichlorobenzene	E	F	E	E
Parathion	P	F	F	F
Pentaborane	F	P	F	F
Pentachlorophenol	F	G	G	G
Pentane	E	G	E	G
Perchloric acid	E	F	G	G
Perchloroethylene	F	NR	G	NR
Perklene	E	NR	G	NR
Permachlor	E	F	E	NR
Petroleum distiliates (naphtha)	G	P	E	
Petroleum spirits	E	F	E	F
Phenol	E	F	F	G
Phenylenediamine	G	P	G	G
Phenylhydrazine	G	G	G	G
Phil-sotv	E	F	E	G
Phosphoric acid	E	G	E	E
Pickling solution	G	G	G	E
Picric acid	E	G	E	G
Pine oil	E	P	E	F
Pitch	E	P	E	F
Plating solutions	E	E	E	E
Potassium alum	G	G	G	E
Potassium bromide	G	G	G	E
Potassium chrome alum	G	G	G	E
Potassium dichromate	F	F	F	E
Potassium ferrocyanide	G	G	G	E
Potassium hydroxide	E	E	E	E
Printing inks	E	G	E	G
Propane gas	E	E	E	E
Propanol (iso)	E	E	E	E
Propyl acetate	G	F	F	G
Propyl alcohol	E	E	E	E
Propyl alcohol (iso)	E	E	E	E
Propylene gas	E	F	E	E
Propyne gas	E	F	E	E
Pyrethrum	E	E	E	E
R				
*Red fuming nitric acid	P	P	P	P
Rhodium fumes and dust	E	E	E	E

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
S				
Silver nitrate	E	G	E	E
Skydrol 500	P	G	P	G
Sodium carbonate metal	G	G	G	E
Sodium hydroxide	E	E	E	E
Sodium sulfite	G	G	E	E
Sodium thiosulfide	G	G	E	E
Solvarsol	E	F	E	F
Solvessos	P	P	G	P
Stearic acid	E	E	E	E
Stoddard solvent	E	F	E	G
Styrene	P	P	F	P
Styrene 100%	P	P	F	P
Sulfuric acid	G	G	G	G
T				
Tannic acid	E	E	E	E
Tetrahydroborane	F	P	F	F
Tetraethyl lead	E	F	E	G
Tetrahydroluran	P	F	F	F
*Toluene	F	P	F	NR
Toluene diisocyanate	F	G	F	G
*Toluol	F	P	F	NR
Trichlor	F	P	G	P
*Trichloroethylene	F	F	G	P
*Trichloroethane	P	P	F	P
Tricresyl phosphate	G	F	E	F
Tridecyl alcohol	G	F	E	F
Triethanolamine	E	G	E	G
Trinitrotoluene	G	P	G	F
Trinitrotoluol	G	P	G	F
Triptane	E	P	E	F
Tung oil	E	P	E	F
Turco No. 2996	P	P		F
Turpentine	G	F	E	F
U				
Unsymmetrical Dimethylhydrazine	F	P	F	P
V				
Varnoline gas	E	F	E	F
Vanadium fume and dust	E	E	E	E
Varsol	G	F	G	F
Vegetable oils	E	G	E	G
W				
Wood alcohol	E	E	E	E
Wood preservatives	G	F	G	G
*Woodyouth	F	P	F	G

CHEMICAL NAME	NEOPRENE	LATEX OR RUBBER	MILLED NITRILE	BUTYL
X				
*Xylene	P	P	F	P
*Xyiol	P	P	F	P
*Xylidine	E	F	F	F
Z				
Zinc Chloride	E	E	E	E

APPENDIX A

SPECIFICATONS FOR INDIVIDUAL TYPES OF PPE

SPECIFICATIONS FOR INDIVIDUAL TYPES OF PPE

1.0 INTRODUCTION

The following information will be utilized during the task hazard assessment, and when determining which products will be used to fulfill the PPE requirements outlined in this program and the PPEP. This appendix contains the OSHA requirements for eye, face, head, hand, body, and foot protection.

2.0 GENERAL REQUIREMENTS

Whenever process, environmental, chemical, radiological, or mechanical hazards exist on site, USAE will ensure that all affected personnel utilize appropriate PPE. When individual personnel provide their own PPE, USAE will assure its adequacy and compliance, including proper maintenance and sanitation of said equipment.

3.0 EYE AND FACE PROTECTION

Each affected employee shall use appropriate eye or face protection when exposed to hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially harmful light radiation. When eye and face protection is required, the following shall apply:

- Side shields will, as a minimum, be used when there is a hazard from flying objects.
- For personnel who wear prescription lenses, the eye protection will either incorporate the prescription in its design, or will be worn over the prescription glasses, without disturbing the position or comfort of the prescription glasses.
- Eye and face protection will be clearly marked with the manufacturer's name.
- Eye and face protection will be selected and worn that protects personnel from the type of eye/face hazard encountered during a given operation.
- If there is a potential for exposure to blood or other infectious fluids, personnel will be required to wear eye and face PPE capable of preventing fluid contact with the eye and face mucous membranes.
- Eye and face protection devices shall be reasonably comfortable, fit snugly, be durable, be easily cleaned and disinfected, and stored in a clean, sanitary location.
- Personnel involved in operations emitting hazardous light levels will wear appropriate filtered lenses.
- Protective eye and face devices will be clearly marked, indicating that they comply with the provisions of ANSI Z87.1-1989.

4.0 HEAD PROTECTION

Each employee who is exposed to operations involving a potential for injury to the head from falling objects, or other forms of head injury, will wear appropriate head protection. Selection and use of head protection devices will comply with the following;

- Head protection devices will comply with ANSI Z89.1-1986, and be stamped accordingly.

- Head protection devices will be maintained and inspected to ensure that they are in working order and that their structural integrity has not been compromised through exposure to chemicals, physical abuse, or improper storage.
- Head protection devices will be selected in accordance with the type and degree of head hazard anticipated for site activities.

5.0 FOOT PROTECTION

Each employee exposed to operations where there is a danger of foot injury due to falling or rolling objects, objects capable of piercing the sole, or other identifiable hazards, will be required to wear appropriate foot protection. Selection and use of foot protection will comply with the following:

- Foot wear used on site will comply with ANSI Z41-1991.
- The degree of foot protection will be consistent with the degree of hazard anticipated for each site operation.
- At a minimum, foot wear will be leather work boots.

6.0 HAND PROTECTION

Each employee exposed to operations where there is danger of hand injury due to skin absorption or contact with hazardous substances, cuts, lacerations, abrasions, punctures, thermal burns, electrocution, temperature extremes, or pinching will be required to wear appropriate hand protection. Selection and use of hand protection will comply with the following:

- USAE will select hand protection based upon an evaluation of the performance characteristics of the protection device relative to the task to be performed, conditions present, duration of use, and the known or potential hazards identified.
- If site personnel have the potential of contact with blood or other infectious materials, they will, as a minimum, wear surgical type latex gloves at the time of potential contact.
- Chemical resistant gloves which come in contact with known contaminated materials will be discarded after each use.

7.0 BODY PROTECTION

Each employee exposed to operations where injury to the body trunk or limbs could occur will be required to wear appropriate protective devices. Operations typically conducted by USAE personnel that may the require use of body/limb protection devices include:

- Working in hot environments – cooling vest or other temperature-reducing device
- Working in cold environments – insulated coveralls, long underwear
- Brush/tree clearing with a bladed weed eater – steel toed boots and Kevlar leg chaps
- Tree/limb removal with a chain saw – steel-toed boots and Kevlar leg chaps
- Lifting heavy objects – lumbar/back support belts, knee support devices
- Rendering first aid – body apron

APPENDIX B

PROTECTIVE CLOTHING MATERIAL GUIDE

PROTECTIVE CLOTHING MATERIAL GUIDE

Tyvek®:	Product of Dupont. Spun-bounded non-woven polyethylene fibers. Has reasonable tear, puncture, and abrasion resistance. Provides excellent protection against particulate contaminants, with very limited chemical resistance. Inexpensive and suitable for disposable garments.
Polyethylene:	Used as a coating on polyolefin material such as Tyvek®, increasing resistance to acids, bases, pesticides, and salts.
Saranex®:	Made of Saran, a Dow product. Coated on Tyvek®. Very good general-purpose disposable material. Better overall protection than Polyethylene. Resistant to PCB's and chlorinated hydrocarbons.
Barricade®:	A Dupont material with better general chemical resistance than Saranex®. Barricade is a thick, tightly seamed material that may be suitable for re-use, depending upon contaminant type and level. Provides excellent protection from a large variety of acids, caustics, organic solvents, and salts.
Responder®:	One of the strongest limited-use materials, with a multi-layer construction. Responder® is one of the few materials with no breakthrough times less than eight hours for the ASTM F1001 test chemicals. It is also the only commercially available material that has been actively tested against CWM.
Butyl rubber:	Resists degradation by many contaminants except halogenated hydrocarbons and petroleum compounds, a common deficiency of most protective materials. Especially resistant to permeation by toxic vapors and gases. Expensive material used in boots, gloves, splash suits, aprons, and fully-encapsulating suits.
Natural rubber:	This is also synthetic latex. Resists degradation by alcohols and caustics. Used in boots and gloves.
Neoprene:	Resists degradation by caustics, acids, and alcohols. Used in boots, gloves, and respirator face pieces and breathing hoses. Commonly available and inexpensive.
Nitrile:	Also referred to as Buna-N, milled Nitrile, Nitrile latex, NBR, acrylonitrile. Resists degradation by petroleum compounds, alcohols, acids, and caustics. Used in boots and gloves. Commonly available and inexpensive.
PVA™:	Polyvinyl alcohol. Resists degradation and permeation by aromatic and chlorinated hydrocarbons and petroleum compounds. Major drawback is its solubility in water. Used in gloves.
PVC:	Polyvinyl chloride. Resists degradation by acids and caustics.

PROTECTIVE CLOTHING MATERIAL GUIDE (cont.)

Viton®:	Product of Dupont. Fluoroelastomer similar to Teflon. Excellent resistance to degradation and permeation by aromatic and chlorinated hydrocarbons and petroleum compounds. Very resistant to oxidizers. Extremely expensive material used in gloves and fully-encapsulating suits.
SilverShield®:	Lightweight, flexible Norfoil™ laminate with excellent chemical resistance. Suggested for vinyl chloride, acetone, ethyl ether, and a large variety of other toxic solvents and caustics. Often used as an over glove for haz-mat situations. Flexible material, but not stretchable, may tear at the seams if overly stressed.
4H:	Five layer patented plastic laminate material intended to provide at least four hours of protection form over 280 chemicals and mixtures. Excellent protection against epoxy, organic solvents, acids, bases, paints, degreasers, and adhesives. Flexible material, but not stretchable, may tear at the seams if overly stressed.
Chloropel®:	Also referred to as CPE or chlorinated polyethylene. ILC Dover product. Used in splash suits and fully-encapsulating suits. No data on permeability. Considered to be a good all-around protective material.
Nomex®:	Product of Dupont. Aromatic polyamide fiber. Noncombustible and flame resistant up to 220°C, thus providing good thermal protection. Very durable and acid resistant. Used in firefighters' turnout gear and some fully encapsulating suits as a base for the rubber.

Chapter 15

STANDARD OPERATING PROCEDURE
VEGETATION REMOVAL OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to perform vegetation removal operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USA Environmental, Inc. (USAE) site personnel, including contractor and subcontractor personnel, involved in the conduct of vegetation removal operations on a site potentially contaminated with UXO/MEC. This SOP is not a stand-alone document and should be used together with Work Plans, other USAE SOPs, the Site Safety and Health Plan (SSHP), applicable Federal, State, local regulations, and contract restrictions and guidance. Consult the documents listed in Section 10.0 of this SOP for additional compliance issues

3.0 SELECTION

Only those personnel that meet the requirements set forth by the Client and USAE will be utilized at the project site to facilitate safe and efficient vegetation removal operations.

4.0 TRAINING

All training on equipment will be either formal or on-the-job (OJT) training. This training will be documented by site personnel and subject to review for accuracy and completeness.

5.0 PERSONNEL PROTECTIVE EQUIPMENT

Level D personal protective equipment (PPE) is required for all personnel engaged in vegetation removal operations. Clothing includes, but is not limited to:

- Coveralls or work clothing as prescribed
- Work gloves, leather or canvas as appropriate
- Safety Glasses
- Hard Hats
- Hearing protection, noise attenuators or ear plugs
- Dust mask, as required by wind conditions and/or the presence of airborne particulate matter
- Other PPE as needed. (e.g., face shield, chainsaw chaps, etc.)

6.0 TEAM COMPOSITION

The Vegetation Removal Team will consist of three qualified personnel, as a minimum. These personnel may include any or all of the following:

- UXO Technician III
- UXO Technician II or I

- Laborers

6.1 UXO TECHNICIAN III

The UXO Technician III is UXO qualified and directs the operation and other team personnel within the context of removal requirements. In addition, the UXO Technician III must be familiar with the equipment being utilized.

6.2 OPERATOR

The operator(s) will be qualified and trained on the equipment being utilized (e.g., chainsaw, weed eater, etc.) and operate the equipment in a safe and efficient manner. The operator performs daily inspections and maintenance functions as recommended in the operator's manual. The operator will perform other duties as needed or directed.

7.0 SAFETY

Safety is paramount and all personnel will observe those safety precautions/warnings that apply or may apply to vegetation removal operations. The precautions listed below are general in nature and personnel will need to review applicable publications for more specific safety precautions/warnings. Distances listed are the minimum required.

- Maintain 200 feet minimum from other teams.
- Maintain safe separation distance from UXO personnel engaged in intrusive work.
- Distances may be increased by the U.S. Army Corps of Engineers OE Safety Specialist as determined by site history, UXO items encountered, terrain features, and other factors that may apply.
- Use equipment safety features.
- Safety precautions/warnings found in the operator's manual/manufacture's publications will be observed.
- Maintain 6 inches of ground clearance during removal operations.
- Communications will be maintained between the Team Leader and Operator(s) at all times.
- Maintain site control.
- Observe UXO safety precautions for items encountered or suspected.
- Ensure PPE is appropriate, serviceable, and worn/used in a proper manner.

8.0 OPERATIONAL PROCEDURES

Personnel will not enter within 10 feet of an operating piece of equipment. If at any time personnel enter closer than 10 feet, the Operator will immediately stop, return the engine to idle speed, and cease operations. Prior to operations commencing, a communications check with all team personnel will be conducted. Hand signals will be devised and used as a means of communication. All team personnel must know these hand signals prior to operations commencing. The hand signals will be documented on the tailgate safety-briefing sheet each morning of operations and at each change of team personnel.

The UXO Technician III will be responsible for the direction and manner in which the vegetation is to be removed. Prior to removal operations commencing, a visual search/survey is conducted to determine the hazards that may be encountered, which may include UXO, terrain slope, vegetation, wildlife, environmental concerns, and PPE requirements. The UXO Technician III will perform a visual search for UXO, ordnance scrap, surface debris, and any other obstruction/object that may pose a hazard to team personnel. Hazardous items, impassable terrain, or vegetation that may affect operations will be marked and team personnel notified.

Team personnel are to ensure that a 6-inch ground clearance is maintained during removal operations. Those areas marked as hazards are to be avoided. The manner in which operations are accomplished will follow safe work practices and procedures. Areas of concern will be addressed to the Senior UXO Supervisor (SUXOS) and/or UXO Safety Officer (UXOSO) as needed. All MEC/UXO items encountered are marked and avoided. Notification of these items will be made to the appropriate personnel.

9.0 SUMMARY

USAE personnel will conduct vegetation removal operations in a safe, efficient, and productive manner and will use this SOP and references, which include changes and revisions.

10.0 REFERENCES

- USAE Corporate Safety and Health Program (CSHP)
- Site-Specific Safety and Health Plan (SSHP)
- Occupational Safety and Health Administration (OSHA) Regulations
- U.S. Army Corp of Engineers (USACE), EM 385-1-1
- Operator's Manual(s) and Manufacture's Publications

Chapter 16

STANDARD OPERATING PROCEDURE
WEATHER EMERGENCIES

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements, procedures, and practices applicable to the conduct of operations during weather emergencies. These procedures outline the rules, guidance, policies, and general information which will be used during operations.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel, who are involved in operations in the exclusion and support zones (EZ and SZ). The procedures outlined here are required to help ensure the safety and health of all site personnel. This SOP is not intended to contain all requirements needed to ensure every weather emergency is covered but to ensure a range of knowledge and information is available so informed decision making takes place. Consult the documents listed in Section 3.0 of this SOP for reference material.

3.0 REFERENCES

The following references were used to contribute information contained within this SOP and develop requirements that apply to the conduct of operations associated with this project. In the event that other hazards are identified outside the scope of this SOP, review and implementation of additional SOPs and references may be needed:

- USAE Safety and Health Program
- OSHA General Industry Standard 29 CFR, Part 1910.120
- USACE Engineer Manual 385-1-1
- National Weather Service
- American Red Cross

4.0 RESPONSIBILITIES

4.1 OCCUPATIONAL SAFETY MANAGER

The Occupational Safety Manager (OSM) will be responsible for ensuring the availability of the resources needed to implement this SOP, and will also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

4.2 SENIOR UXO SUPERVISOR

The Senior Unexploded Ordnance Supervisor (SUXOS) will ensure that this SOP is implemented by all operations during weather emergencies. The SUXOS will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operational Log.

4.3 UXO TECHNICIAN III

The UXO Technician III (UXOTIII) shall be responsible for the field implementation of this SOP and the safety and health requirements outlined in Section 5.0 of this SOP. In the absence of a SUXOS, the UXOTIII shall be responsible for implementing the SUXOS's responsibilities outlined in Paragraph 4.2.

4.4 UXO SAFETY OFFICER/SITE SAFETY AND HEALTH OFFICER

The UXO Safety Officer (UXOSO)/Site Safety and Health Officer (SSHO) will be responsible for ensuring that the safety and health hazards and control techniques associated with this SOP are discussed during the initial site hazard training and the daily tailgate safety briefings. The UXOSO/SSHO will also be responsible for daily inspection of site operations and conditions to ensure their initial and continued compliance with applicable SOPs and other guidelines.

5.0 PROCEDURE

All site personnel, including contractor and subcontractor personnel, involved in any site operation shall be familiar with the contents of this SOP. Since the safety and health of all site personnel, the environment, and the general population is of paramount importance, all personnel will be expected to follow the procedures at all times. Violation of these procedures, or those imposed by the UXOSO/SSHO, may lead to personal injury or property damage, and may be grounds for positive disciplinary action.

5.1 INFORMATION REQUIREMENTS

5.1.1 INFORMATION REQUIREMENTS FOR THE SITE

Daily weather conditions will be a part of the daily briefing. Many people incur injuries or are killed due to misinformation and/or inappropriate behavior during severe weather. During severe weather, project personnel will seek shelter in an appropriate location (i.e., building or vehicle).

Generally speaking, identify and seek shelter that is appropriate for the type of severe weather you are encountering. Proper shelter will always include sound structure and remove you from the elements.

When available, pay attention to weather warning devices such as NOAA weather radio, commercial radio, and/or credible weather detection systems, however, do not let this information override good common sense.

Remember: The individual is ultimately responsible for his/her personal safety and has the right to take appropriate action when threatened by severe weather.

The information listed below shall be followed at all times by on-site personnel conducting operations in any location of the site:

- The Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP), Corporate Safety and Health Program, and all other required safety and health guidelines will be met at all times.
- All necessary, and feasible, precautions will be taken to prevent injury to personnel.
- Potentially harmful situations will be immediately reported to the UXOSO/SSHO.
- All personal injuries, no matter how minor, will be reported to the UXOSO/SSHO.
- Buddy system procedures shall be enforced during all site operations.
- The number of personnel in the EZ shall be the minimum number necessary to perform work tasks in a safe and efficient manner.

- Site personnel shall check in with the UXOSO/SSHO prior to leaving the site, and again upon returning to the site.
- Site visitors are to be escorted by UXO-qualified personnel at all times, and site operations will cease if non-UXO-qualified personnel enter an area where UXO operations are being conducted.
- Site personnel shall remain aware of site conditions at all times and shall alert the UXOSO/SSHO to any changes which could pose additional hazards.

5.1.2 INFORMATION REQUIREMENTS FOR THUNDERSTORMS

Thunderstorms affect relatively small areas when compared with hurricanes and winter storms. The typical thunderstorm is 15 miles in diameter and despite their small size, ALL thunderstorms are dangerous! Thunderstorms lasts an average of 30 minutes. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10 percent are classified as severe.

No place is absolutely safe from severe weather; however, some places are safer than others. The information listed below will be briefed to on-site personnel conducting operations at the project site:

Before Lightning Strikes:

- Keep an eye on the sky. Look for darkening skies, flashes of light, or increasing wind. Listen for the sound of thunder.
- If you can hear thunder, you are close enough to the storm to be struck by lightning. Go to safe shelter immediately.
- Listen to NOAA Weather Radio or commercial radio for the latest weather forecasts and storm information.

When a Storm Approaches:

- Find shelter in a building or car. Large enclosed structures (substantially constructed buildings) tend to be much safer than smaller or open structures. In general, fully enclosed metal vehicles such as cars, trucks, buses, vans, etc. with the windows rolled up provide good shelter from many weather conditions.
- The risk for lightning injury depends on whether the structure incorporates lightning protection, construction materials used, and the size of the structure.
- Avoid being in or near high places, open fields, isolated trees, rain or picnic shelters, communications towers, flagpoles, light poles, bleachers (metal or wood), metal fences, water (lakes, streams, rivers, etc.).
- Avoid use of the telephone, washing your hands, or any contact with conductive surfaces with exposure to the outside such as metal door or window frames, electrical wiring, telephone wiring, cable TV wiring, plumbing, etc. if lightning is a factor.

After the Storm Passes:

- Stay away from storm-damaged areas
- Listen to the radio for information and instructions.
- Do not resume work until the all clear has been given by the UXOSO/SSHO.

If Someone is Struck by Lightning:

- Initiate the site EMS response system.
- Render First Aid and CPR as necessary.

5.1.3 INFORMATION REQUIREMENTS FOR TORNADOS

Although tornadoes occur in many parts of the world, they are found most frequently in the United States. In an average year, 1,200 tornadoes cause 70 fatalities and 1,500 injuries nationwide.

Tornadoes can occur at any time of the year. Tornadoes have occurred in every state, but they are most frequent east of the Rocky Mountains during the spring and summer months. In the southern states, peak tornado occurrence is March through May.

The information listed below will be briefed to on-site personnel conducting operations at the project site:

When Tornado Producing Storms are in the Area:

- Ensure all site personnel are briefed on the location(s) of tornado shelters.
- Keep an eye on the sky. Look for darkening skies, flashes of light, or increasing wind.
- Listen to NOAA Weather Radio or commercial radio for the latest weather forecasts and storm information concerning tornado watches and warnings.
- When weather conditions are such that a tornado is likely prepare to move to safety.
- If a tornado is sighted or warning is given move to the nearest shelter as quickly as possible.

During a Tornado:

- Remain in the shelter.
- Do not open doors or windows.
- Stay within the strongest portion of the shelter.

After the Tornado Passes:

- Stay away from damaged areas.
- Listen to the radio for information and instructions.
- Re-enter buildings with extreme caution.
- Be alert to fire hazards such as broken electrical wires or damaged electrical equipment, gas or oil leaks, and downed power lines.
- Report broken utilities to the appropriate authorities.
- Do not resume work until the all clear has been given by the UXOSO/SSHO.

If Someone is Injured:

- Initiate the site EMS response system.
- Render First Aid and CPR as necessary.

5.1.4 INFORMATION REQUIREMENTS FOR FLOODS

When a Storm Approaches:

- Keep an eye on the sky. Look for darkening skies, flashes of light, or increasing wind. Listen for the sound of thunder.
- Listen to NOAA Weather Radio or commercial radio for the latest weather forecasts and storm information concerning flood watches and warnings.
- Move out of and away from low laying areas that may flood.

- If you are in a flood zone, move to higher ground away from rivers, streams, creeks, and storm drains.
- Find shelter in a building. Large enclosed structures (substantially constructed buildings) tend to be much safer than smaller or open structures.

During a Flood:

- Remain in the shelter.
- Do not open doors or windows.
- Do not drive around warning barricades.
- Do not attempt to drive or wade through flooded areas.
- Stay away from storm-damaged areas.
- Listen to the radio for information and instructions.
- If you vehicle stalls in rapidly rising waters, abandon it immediately and climb to higher ground.
- Do not resume work until the all clear has been given by the UXOSO/SSHO.

If Someone is Injured:

- Initiate the site EMS response system.
- Render First Aid and CPR as necessary.

5.2 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Site personnel will at all times comply with safety precautions, safe work practices, and PPE requirements detailed in the SSHP for each task. The continued wearing of PPE may be appropriate during weather emergencies. The use of work clothing, gloves, safety glasses, and boots can help in reducing injury during severe weather conditions.

18

STANDARD OPERATING PROCEDURE
OPS-03 – DEMOLITION/DISPOSAL OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the conduct of demolition/disposal operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USA Environmental, Inc. (USA) site personnel, involved in the conduct of UXO/MEC demolition/disposal operations. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with approved project plans and applicable referenced regulations. Consult the documents listed in Section **Error! Reference source not found.** of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES

3.1 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) will be responsible for assuring that adequate safety measures and housekeeping are performed during all phases of site operations, to include demolition activities, and will visit site demolition locations, as deemed necessary, to ensure that demolition operations are carried out in a safe, clean, efficient, and economic manner. The demolition activities will then be conducted under the direct control of the SUXOS, who will have the responsibility of supervising all demolition operations within the area.

3.2 RMC PERSONNEL

RMC (Reacitives Management Corporation) is responsible for ensuring that all explosive operations are conducted in accordance with all State, Federal and local laws and requirements. In addition RMC is subcontracted to GES (Guardian Environmental Services), for providing Demolition over site for this project. RMC personnel will insure all demolition operations meet the above.

RMC personnel will inspect all demolition shot's after setup to ensure that all Federal, State and local requirements are being met.

3.3 UXO SAFETY/QUALITY CONTROL OFFICER

The UXO Safety/Quality Control Officer (UXOSO/QCO) for the site is responsible for ensuring that all demolition operations are being conducted in a safe and healthful manner, and is required to be present during all MEC demolition operations. The UXOSO/QCO, assisted by demolition team personnel, will inspect each demolition shot and an area of appropriate radius after each demolition shot.

3.4. GENERAL OPERATIONAL AND SAFETY PROCEDURE

All personnel, including subcontractor personnel, involved in operations on UXO/MEC-contaminated sites will be familiar with the potential safety and health hazards associated with the conduct of demolition/disposal operations, and with the work practices and control techniques used to reduce or eliminate these hazards. During demolition operations, the general safety provisions listed below will be followed by all demolition personnel, at all times. Noncompliance with the general safety provisions listed below will result in disciplinary action, which may include termination of employment.

All safety regulations applicable to demolition range activities and demolition and MEC materials involved will be complied with.

- Any defect or unusual condition noted that is not covered by this SOP will be reported immediately to the SUXOS or UXOSO for evaluation and/or correction.
- All personnel engaged in the destruction of MEC will wear clothing made of natural fiber, close-weave clothes, such as cotton. Synthetic material such as nylon is not authorized unless treated with anti-static material.
- Care will be taken to minimize exposure to the smallest number of personnel, for the shortest time, to the least amount of hazard, consistent with safe and efficient operations.
- Two-way radios will not be operated in close proximity of the demolition range while the pit is primed or during the priming process. Radio transmissions and explosives will be separated by a minimum of 50 ft.
- No demolition operation will be left unattended during the active portion of the operation.
- A minimum radius (approximately 50 feet) around the demolition pit will be cleared of dry grass, leaves, and other extraneous combustible materials.
- No demolition activities will be conducted if there is less than a 2,000-ft ceiling or if wind velocity is in excess of 20 mph.
- RMC will make all required notification to the local authorities in accordance with site requirements.

4.0 GENERAL REQUIREMENTS

The general demolition range requirements listed below will be followed at all times:

- After each series of detonations, a search will be made of the surrounding area for UXO/MEC. Items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next shot. Fuzed ammunition, or items that may have internally damaged components, will be detonated in place, if possible.
- All shots will be dual primed.

4.1 DEMOLITION OPERATIONS

The disposal of fuzed and un-fuzed 20 and 40mm projectiles located at the Elkton Fire Hole #3 site:

- The rounds to be disposed of will be placed in a shallow trench six to twelve inches deep and 12 inches wide
- Jet perforators-32/19.5 gram shape charges will be place to remove fuzes and split the rounds will be placed on the rounds.
- Detonating Cord-80 grain per foot will be utilized as a trunk line and to tie in all perforators.
- After the set and prior to placing sand bags over all charges, RMC will inspect the setup.
- The individual assigned to make the connections at the panel will not complete the circuit at the panel, and will not give the signal for detonation, until satisfied that all personnel in the vicinity have been evacuated to a safe distance. When using the panel, the switch must be locked in the open position until ready to fire, and the single key must be in the blaster's possession.
- Prior to initiating a demolition shot(s), a warning will be given; the type and duration of such warning will be determined by the prevailing conditions at the demolition range. At a minimum, this should be an audible signal using a siren, air horn, or megaphone, which is sounded for a duration of one minute, five minutes prior to the shot and again one minute prior to the shot.

In order to control the effects of demolition operations and to ensure the safety of site personnel, the following meteorological limitations and requirements will apply to demolition operations:

- Demolition operations will not be conducted during electrical storms or thunderstorms.
- No demolition operations will be conducted if the surface wind speed is greater than 20 miles per hour, or with a ceiling of less than 2,000 ft.
- Demolition operations will not be conducted during periods of visibility of less than one mile caused by, but not limited to, dense fog, blowing snow, rain, sand storms, or dust storms.
- Demolition operations will not be initiated until an appropriate time after sunrise, and will be secured at an appropriate time prior to sunset (see Section 0).

5.0 Pre-Demolition operational Brief

It is the belief of USA that the success of any operation is dependent upon a thorough brief, covering all phases of the task, which is presented to all affected personnel. The SUXOS will brief all personnel involved in range operations in the following areas:

- Type of UXO/MEC being destroyed
- Type, placement, and quantity of demolition material being used
- Method of initiation (electric)
- Equipment being used (i.e., galvanometer, RFD, etc.)
- Misfire procedures
- Post-shot clean-up of

6.0 TASK ASSIGNMENTS

Individuals with assigned tasks will report the completion of the task to the SUXOS. The types of tasks that may be required are:

- Contact local authorities and fire response personnel, and get air clearance, as required.
- Secure all access roads to the range area.
- Visually check range for any unauthorized personnel.
- Check firing wire for continuity and shunt.
- Prepare designated pits as required.
- Check continuity of detonators.
- Secure detonators in a safe location.
- Place UXO/MEC in pit, and place charge in desired location.

7.0 POST DEMOLITON PROCEDURES

Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so, and follow the procedures listed below:

- After the **"All Clear"** signal, check pit for low orders or kick outs.
- Examine pit, and remove any large fragmentation, as needed.
- Back fill hole, as necessary.

- Police all equipment.
- Notify authorities, fire department, etc., that the operation is complete.

8.0 REGULATORY REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of UXO demolition/disposal operations:

- USA Corporate Safety and Health Program
- OSHA General Industry Standards, 29 CFR 1910
- OSHA Construction Standards, 29 CFR 1926
- DDESB TP-16, Methodology for Calculation of Fragmentation Characteristics
- DoD 4160.21-M, Defense Reutilization and Marketing Manual
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- AR 385-64, U.S. Army Explosives Safety Program
- AR 385-10, Army Safety Program
- DA PAM 385-64, U.S. Army Explosives Safety Program
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- Applicable TM 60 Series Publications
- AR 190-11, Physical Security of Arms, Ammunition, and Explosives
- ATF 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- DOT, 49 CFR, Parts 100 to 199, Transportation (applicable sections)
- EPA, 40 CFR Parts 260 to 299, Protection of Environment (applicable sections).
- AR 385-40 w/ USACE Supplement 1, Accident Reporting & Records
- Basic Safety Concepts and Considerations for Ordnance and Explosives Operations, EP 385-1-95a
- USACE EM 385-1-1, Safety and Health Requirements Manual

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STANDARD OPERATING PROCEDURE
OPS-04 – BURN/DISPOSAL OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the conduct of burn/disposal operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all site personnel involved in the conduct of UXO/MEC burn/disposal operations. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with approved project plans and applicable referenced regulations.

3.0 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) will be responsible for assuring that adequate safety measures and housekeeping are performed during all phases of site operations, to include burn/disposal activities, and will ensure that burn/disposal operations are carried out in a safe, clean, efficient, and economic manner. The burn activities will then be conducted under the direct control of the SUXOS.

3.1 RMC PERSONNEL

RMC (Reacitives Management Corporation) is responsible for ensuring that all explosive/burn operations are conducted in accordance with all State, Federal and local laws and requirements. In addition RMC is subcontracted to GES (Guardian Environmental Services), for providing burn/disposal over site for this project. RMC personnel will insure all burn/disposal operations meet the above.

RMC personnel will inspect all Burn Coffins after setup to ensure that all Federal, State and local requirements are being met.

3.2 UXO SAFETY/QUALITY CONTROL OFFICER

The UXO Safety/Quality Control Officer (UXOSO/QCO) for the site is responsible for ensuring that all burn operations are being conducted in a safe and healthful manner, and is required to be present during all MEC burn operations. The UXOSO/QCO, assisted by burn/disposal team personnel, will inspect each burn coffin and an area of appropriate radius after each burn area.

3.3 GENERAL OPERATIONAL AND SAFETY PROCEDURE

All personnel, including subcontractor personnel, involved in operations on UXO/MEC-contaminated sites will be familiar with the potential safety and health hazards associated with the conduct of burn/disposal operations, and with the work practices and control techniques used to reduce or eliminate these hazards. During burn operations, the general safety provisions listed below will be followed by all personnel, at all times. Noncompliance with the general safety provisions listed below will result in disciplinary action, which may include termination of employment.

All safety regulations applicable to open pit burning of MEC materials involved will be complied with.

- Any defect or unusual condition noted that is not covered by this SOP will be reported immediately to the SUXOS or UXOSO for evaluation and/or correction.
- All personnel engaged in the destruction of MEC will wear clothing made of natural fiber, close-weave clothes, such as cotton. Synthetic material such as nylon is not authorized unless treated with anti-static material.

- Care will be taken to minimize exposure to the smallest number of personnel, for the shortest time, to the least amount of hazard, consistent with safe and efficient operations.
- A minimum radius (approximately 50 feet) around the burn pit will be cleared of dry grass, leaves, and other extraneous combustible materials.
- RMC will make all required notification to the local authorities in accordance with site requirements.

4.0 GENERAL REQUIREMENTS

The general burn/disposal requirements listed below will be followed at all times:

- After each series of burns, a search will be made of the surrounding area for UXO/MEC. Items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next burn.
- All burns will be dual primed.

4.1 BURN/DISPOSAL OPERATIONS

The disposal of Caps, Detonators, Incendiary Bomblets, Primers, Flares etc located at the Elkton Fire Hole #3 site:

- A hole large and deep enough for12'X4'X4' concrete coffin will be dug in an area free of brush and flammable material.
- The coffin will be lowered into the hole.
- The MEC to be disposed of will be placed inside the concrete coffin on top of wood dunn-age.
- The wood dunn-age will be soaked with diesel fuel
- The dunn-age will be primed with plastic bags filled with smokeless powder and initiated by electric squibs.
- A wire mesh screen will be on top of the MEC to reduce to possibility of kick-outs.
- After the MEC burn is set up and prior, RMC will inspect the setup.
- Prior to initiating a burn, the area will be cleared of all personnel. a warning will be given; the type and duration of such warning will be determined by the prevailing conditions at the demolition range. At a minimum, this should be an audible signal using a siren, air horn, or megaphone, which is sounded for a duration of one minute, five minutes prior to the shot and again one minute prior to the shot.

4.2 METEOROLOGICAL CONDITIONS

In order to control the effects of demolition operations and to ensure the safety of site personnel, the following meteorological limitations and requirements will apply to demolition operations:

- Burn operations will not be conducted during electrical storms or thunderstorms.
- Burn operations will not be conducted during periods of visibility of less than one mile.
- Burn operations will not be initiated until an appropriate time after sunrise, and will be secured by noon.
- A fire watch will be set until the dunn-age is completely consumed.
- After a minimumwait time of eight hours the coffin will be lifted from the ground and dumped out.

- UXO personnel will sort through the burn residue to ensure all items are free of any hazardous/ energetic material.
- The SSO and SUXOS will verify the condition of all burned material.

5.0 PRE-BURN OPERATIONAL BRIEF

It is the belief of USA that the success of any operation is dependent upon a thorough brief, covering all phases of the task, which is presented to all affected personnel. The SUXOS will brief all personnel involved in range operations in the following areas:

- Type of UXO/MEC being burned
- Type, placement, of initiating charge
- Method of initiation (electric)
- Equipment being used (i.e., galvanometer, RFD, etc.)
- Misfire procedures
- Post-burn clean-up of

6.0 TASK ASSIGNMENTS

Individuals with assigned tasks will report the completion of the task to the SUXOS. The types of tasks that may be required are:

- Contact local authorities and fire response personnel, and get air clearance, as required.
- Secure all access roads to the range area.
- Visually check range for any unauthorized personnel.
- Check firing wire for continuity and shunt.
- Prepare designated pits as required.
- Check continuity of squibs.
- Place UXO/MEC in coffin, and place charge in desired location.

7.0 POST BURN PROCEDURES

Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so, and follow the procedures listed below:

- After the **"All Clear"** signal, check pit for low orders or kick outs.
- Examine pit, and remove any large fragmentation, as needed.
- Back fill hole, as necessary.
- Police all equipment.
- Notify authorities, fire department, etc., that the operation is complete.

8.0 REGULATORY REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of UXO demolition/disposal operations:

- USA Corporate Safety and Health Program

- EODB 60A-1-1-31
- OSHA General Industry Standards, 29 CFR 1910
- OSHA Construction Standards, 29 CFR 1926
- DDESB TP-16, Methodology for Calculation of Fragmentation Characteristics
- DoD 4160.21-M, Defense Reutilization and Marketing Manual
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- AR 385-64, U.S. Army Explosives Safety Program
- AR 385-10, Army Safety Program
- DA PAM 385-64, U.S. Army Explosives Safety Program
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- Applicable TM 60 Series Publications
- AR 190-11, Physical Security of Arms, Ammunition, and Explosives
- ATF 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- DOT, 49 CFR, Parts 100 to 199, Transportation (applicable sections)
- EPA, 40 CFR Parts 260 to 299, Protection of Environment (applicable sections).
- AR 385-40 w/ USACE Supplement 1, Accident Reporting & Records
- Basic Safety Concepts and Considerations for Ordnance and Explosives Operations, EP 385-1-95a
- USACE EM 385-1-1, Safety and Health Requirements Manual